SHADOWPROTECT™
DESKTOP EDITION

Complete System and Data Protection

ShadowProtect™ Desktop Edition

User Guide

STORAGECRAFT™
Technology Corporation

User Guide for
ShadowProtect™ Desktop Edition Version 3.0

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TABLE OF CONTENTS

END-USER LICENSE AGREEMENT FOR..... 3
TABLE OF CONTENTS..... 10
TABLE OF FIGURES 14
TABLE OF TABLES..... 16
CHAPTER 1: ABOUT THE USER GUIDE 17
1.1 Welcome 17
1.2 Additional Information 17
1.3 Conventions 18
1.4 How This Guide Is Organized 18
CHAPTER 2: INTRODUCTION 19
2.1 About ShadowProtect Desktop Edition 19
Components of ShadowProtect..... 20
2.2 How Does ShadowProtect Work? 21
2.3 Features of ShadowProtect Desktop Edition 24
2.4 How You Can Use ShadowProtect Desktop Edition..... 24
2.4.1 Use Case 1 – Bare Metal Recovery 24
2.4.2 Use Case 2 – Live Desktop Backup..... 25
2.4.3 Use Case 3 – ExactState Backup Image File and Folder Access 25
2.4.4 Use Case 4 – Individual File and Folder Restore 25
2.4.5 Use Case 5 – Update an Existing Backup Image..... 26
2.4.6 Use Case 6 – Create Full and Incremental Backup Images 26
2.4.7 Use Case 7 – Restore Backup Images to Different Hardware/Virtual Environments. 27
CHAPTER 3: INSTALLING SHADOWPROTECT..... 28
3.1 Requirements 28
3.1.1 Minimum System Requirements..... 28
3.1.2 Supported Operating Systems..... 28
3.1.3 Supported File Systems..... 28
3.1.4 Supported Storage Media..... 28
3.2 Trial Version 28
3.3 Evaluation Version..... 28
3.4 ShadowProtect Licensing..... 29
3.5 Installing ShadowProtect Desktop Edition 29
3.6 Testing the StorageCraft Recovery Environment CD 30
3.7 Starting ShadowProtect Desktop Edition..... 30
3.8 Activating and Deactivating ShadowProtect Desktop Edition 30
Deactivating ShadowProtect Desktop Edition..... 32
3.9 Uninstalling ShadowProtect Desktop Edition 32
CHAPTER 4: ABOUT THE USER INTERFACE 34
4.1 About the Menu Bar..... 35
4.1.1 File 35
4.1.2 Tasks 35
4.1.3 View..... 36
4.1.4 Options..... 36

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4.1.5 Help 36
4.2 About the Left Panel (Task Panel) 37
4.2.1 View 37
4.2.2 Tasks 37
4.2.3 Tools 38
4.2.4 Help 39
4.2.5 License 39
4.2.6 Status 39
4.2.7 Info 40
4.3 About the Center Panel (Tab Panel) 40
4.3.1 Wizards 40
4.3.2 Disk Map 40
4.3.3 Backup Jobs 40
4.3.4 Destinations 41
4.3.5 Backup History 42
4.4 About the Right Panel (Network Panel) 42
4.4.1 Connect 42
4.4.2 Disconnect 42
4.4.3 Add 42
4.4.4 Delete 42
4.4.5 Properties 42
4.4.6 Managed Nodes 42
CHAPTER 5: CREATING BACKUP IMAGE FILES 43
5.1 What is a Backup Image File 43
5.2 ShadowProtect File Types 43
5.3 File Naming Conventions 44
5.4 File Dependencies 44
5.5 Backup Image File Options 45
5.5.1 Backup Image Files (Full, Differential and Incremental) 45
5.5.2 Storage Location to Write Backup Image Files 46
5.5.3 Compression Level 47
5.5.4 Password Encrypting Backup Image Files 48
5.5.5 Password Encrypting Backup Image Files Using a Key File 48
5.5.6 Splitting a Backup Image File into Smaller Files 48
5.5.7 Backup Comments 49
5.6 Advanced Backup Image File Options 49
5.6.1 Backup Advanced Options 49
5.6.2 Include Free Space 49
5.6.3 Performance Throttling 49
5.6.4 2nd and Subsequent Full Backups are Differentials 49

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5.6.5 Image Advanced Options 49
5.6.6 Enable Write Caching 49
5.6.7 Enable Concurrent Task Execution 49
5.6.8 Enable Self-healing Incremental Recovery 49
5.6.9 Auto Execution of Unexecuted Task 50
5.6.10 Commands Advanced Options 50
5.6.11 Pre-Snapshot, Post-Snapshot and Post-Backup Commands 50
5.6.12 Encryption Advanced Options 51
5.6.13 Retention Advanced Options 51
5.7 Other Operations 51
5.7.1 Destinations 51
5.7.2 Execute a Backup Job Immediately 53
5.7.3 Editing a Backup Job 54
5.7.4 Disabling and Enabling a Backup Job 54
5.7.5 Deleting a Backup Job 54
5.8 Manually Creating a Backup Image File (Backup Now) 54
5.8.1 Steps for Manually Creating a Backup Image File 54
5.9 Scheduling Backup Jobs 58
5.9.1 Backup Image Schedule Options 58
5.9.2 Steps for Creating a Scheduled Backup Job 59
CHAPTER 6: SHADOWPROTECT IMAGEMANAGER 69
6.1.1 Starting the ImageManager 69
6.1.2 The ShadowProtect ImageManager User Interface 69
6.1.3 File 69
6.1.4 Connect to Server 69
6.1.5 Policy 70
6.1.6 Add Policy 70
6.1.7 Edit Selected Policy 71
6.1.8 Delete Selected Policy 71
6.1.9 Refresh Policy List 71
6.1.10 Help 71
6.1.11 Policies Tab 71
6.1.12 Summary Tab 72
6.1.13 Logs Tab 72
6.1.14 History Tab 72
CHAPTER 7: RESTORING FILES AND FOLDERS 74
7.1 Mounting Backup Image Options 74
7.1.1 Mounting a Backup Image as a Drive Letter 75
7.1.2 Mounting a Backup Image as a Mount Point 75
7.1.3 Mounting a Backup Image as Read-Only 75
7.1.4 Mounting a Backup Image as Writeable 75
7.2 Mounting Backup Images Using the Context Menu 75
7.2.1 Quick Mount 75
7.2.2 Mount 75
7.3 Steps for Restoring Files and Folders 76
7.4 Mounting a Backup Image as a Shared Writeable Drive 80

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CHAPTER 8: RESTORING BACKUP IMAGE FILES 82
8.1 Steps for Restoring a Volume 82
CHAPTER 9: DISMOUNTING BACKUP IMAGE FILES 87
9.1 Dismounting Backup Images Using the Context Menu 87
9.1.1 Dismount 87
9.1.2 Quick Dismount 87
9.2 Steps for Dismounting a Backup Image File Using the Backup Image Dismount Wizard 87
CHAPTER 10: BACKUP IMAGE TOOL 91
CHAPTER 11: STORAGECRAFT RECOVERY ENVIRONMENT 97
11.1 About the StorageCraft Recovery Environment 97
11.2 Booting to the StorageCraft Recovery Environment 99
11.3 Loading Drivers in the Recovery Environment 101
11.4 Using Hardware Independent Restore (HIR) 102
11.5 HIR Advanced Options 103
11.6 Using Ultra VNC 104
11.6.1 Steps to Enabling UltraVNC Remote Management 104
11.6.2 Additional Information on UltraVNC Server and UltraVNC Viewer 106
11.7 Using the Network Configuration Utility 106
11.8 RECOVERING A SYSTEM VOLUME 108
CHAPTER 12: REMOTE MANAGEMENT 110
12.1 Connect to Remote Nodes 110
12.2 Disconnect from Remote Nodes 110
12.3 Adding Remote Nodes 110
12.4 Deleting Remote Nodes 111
12.5 Properties Information for Remote Nodes 111
CHAPTER 13: OTHER OPERATIONS 113
13.1 Log Files 113
13.2 Email Notification 113
13.2.1 Configuring Email Notification 113
13.2.2 Email Notification Information 114
13.2.3 Test Email Notification 114
13.3 Deleting Backup Image Files 114
13.4 Checking and Verifying Backup Image Files 115
CHAPTER 14: BEST PRACTICES 116
APPENDIX A: PRODUCT SUPPORT 117
A.1 Complimentary Technical Support 117
A.2 E-Mail Support 117
A.3 Telephone Technical Support 117
APPENDIX B: COMMON RETENTION POLICY CONFIGURATIONS 118
APPENDIX C: GLOSSARY 120

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TABLE OF FIGURES

Figure 1: ShadowProtect Desktop Edition Main Page 17
Figure 2: Creating a Point-in-time Image 22
Figure 3: Mounting a Backup Image File to Restore Files and Folders 23
Figure 4: ShadowProtect Main Screen 34
Figure 5: Destination Dialog Screen 53
Figure 6: Backup Wizard Welcome Screen 55
Figure 7: Volumes to Back up 55
Figure 8: Select Where to Store Your Backup 56
Figure 9: Backup Schedule 56
Figure 10: Backup Options 57
Figure 11: Backup Summary 58
Figure 12: Backup Wizard Welcome Screen 60
Figure 13: Specify Volumes for Scheduled Backup Job 60
Figure 14: Specify Backup Name and Destination for Scheduled Backup Job 61
Figure 15: Backup Now Dialog Screen 62
Figure 16: Backup Later Schedule Dialog Screen 62
Figure 17: Weekly Backup Schedule Dialog Screen 63
Figure 18: Monthly Backup Schedule Dialog Screen 63
Figure 19: Continuous Incrementals Backup Schedule Dialog Screen 64
Figure 20: Scheduled Backup Job Retention Policy Dialog Screen 65
Figure 21: Options for Scheduled Backup Job 66
Figure 22: Advanced Options for Scheduled Backup Job 67
Figure 23: Wizard Summary for Scheduled Backup Job 68
Figure 24: ShadowProtect ImageManager 69
Figure 25: Connect to Image Management Server Configuration dialog 70
Figure 26: Add New Image Management Policy 70
Figure 27: About ImageManager Client 71
Figure 28: ShadowProtect ImageManager Status 72
Figure 29: ShadowProtect ImageManager calendar view of logs 73
Figure 30: Explore Backup Wizard Welcome Screen 76
Figure 31: Select Backup Image File to Browse 77
Figure 32: Backup Image Dependencies 77
Figure 33: Options for Exploring a Backup Image 78
Figure 34: Wizard Summary for Exploring a Backup Image 80
Figure 35: Restore Wizard Welcome Screen 82
Figure 36: Select Image to Restore 83
Figure 37: Backup Image Dependencies 84
Figure 38: Restore Destination 85
Figure 39: Specify the Restoration Options 86
Figure 40: Restore Volume Wizard Summary 86
Figure 41: Backup Image Dismount Wizard Welcome Screen 88
Figure 42: Select Backup Image to Dismount 88
Figure 43: Backup Image Dismount Options 89
Figure 44: Backup Image Dismount Summary 90

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Figure 45: Backup Image Tool Wizard Welcome Screen 91
Figure 46: Specify Source Image File 92
Figure 47: Backup Image Dependencies 93
Figure 48: Backup Image Tool Destination Image File. 94
Figure 49: Backup Image Tool Options 95
Figure 50: Advanced Options for Backup Image Tool 96
Figure 51: Backup Image Tool Wizard Summary 96
Figure 52: StorageCraft Recovery Environment User Interface 97
Figure 53: ShadowProtect CD Boot Options 100
Figure 54: Start Networking Option 100
Figure 55: StorageCraft Recovery Environment User Interface 101
Figure 56: Loading Drivers From the Recovery Environment 102
Figure 57: HIR Configuration Tool 103
Figure 58: HIR in the Restore Wizard 104
Figure 59: Setting UltraVNC Password 105
Figure 60: StorageCraft Recovery Environment Running Remotely 106
Figure 61: Start Networking option 107
Figure 62: Network Configuration Utility Main Screen 107
Figure 63: Browse Network and Map Drives 108
Figure 64: Agent Options dialog screen 114
Figure 65: Comparison of Full with Incremental Backup Configurations with Retention Policy Set to Retain the Three (3) Most Recent Image Sets. 119

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TABLE OF TABLES

Table 1: Components included in ShadowProtect 20
Table 2: Comparison of Snapshot Methods Available in ShadowProtect 21
Table 3: Bare Metal Recovery Comparison of ShadowProtect Versus Traditional Methods 23
Table 4: ShadowProtect File Types 43
Table 5: Examples of Backup Image File Names with a Description of the File 44
Table 6: Full and Incremental Backup Image Files 45
Table 7: Full Backup Images and Full with Incrementals Backup Images - Advantages and Disadvantages 46
Table 8: Advantages and Disadvantages for Various Storage Locations 47
Table 9: Backup Image File Compression Levels 47
Table 10: Backup Image Schedule Options 59
Table 11: Methods for Restoring Files and Folders 74

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CHAPTER 1: ABOUT THE USER GUIDE

1.1 Welcome

Welcome to the ShadowProtect Desktop Edition User Guide. This User Guide describes the ShadowProtect technology, as well as how to install, operate and derive the maximum benefits from ShadowProtect Desktop Edition. All references in this User Guide to ShadowProtect are to ShadowProtect Desktop Edition.

The ShadowProtect User Guide incorporates screen captures of the user interface for describing features, how to use functions and for graphically displaying where to access ShadowProtect features.

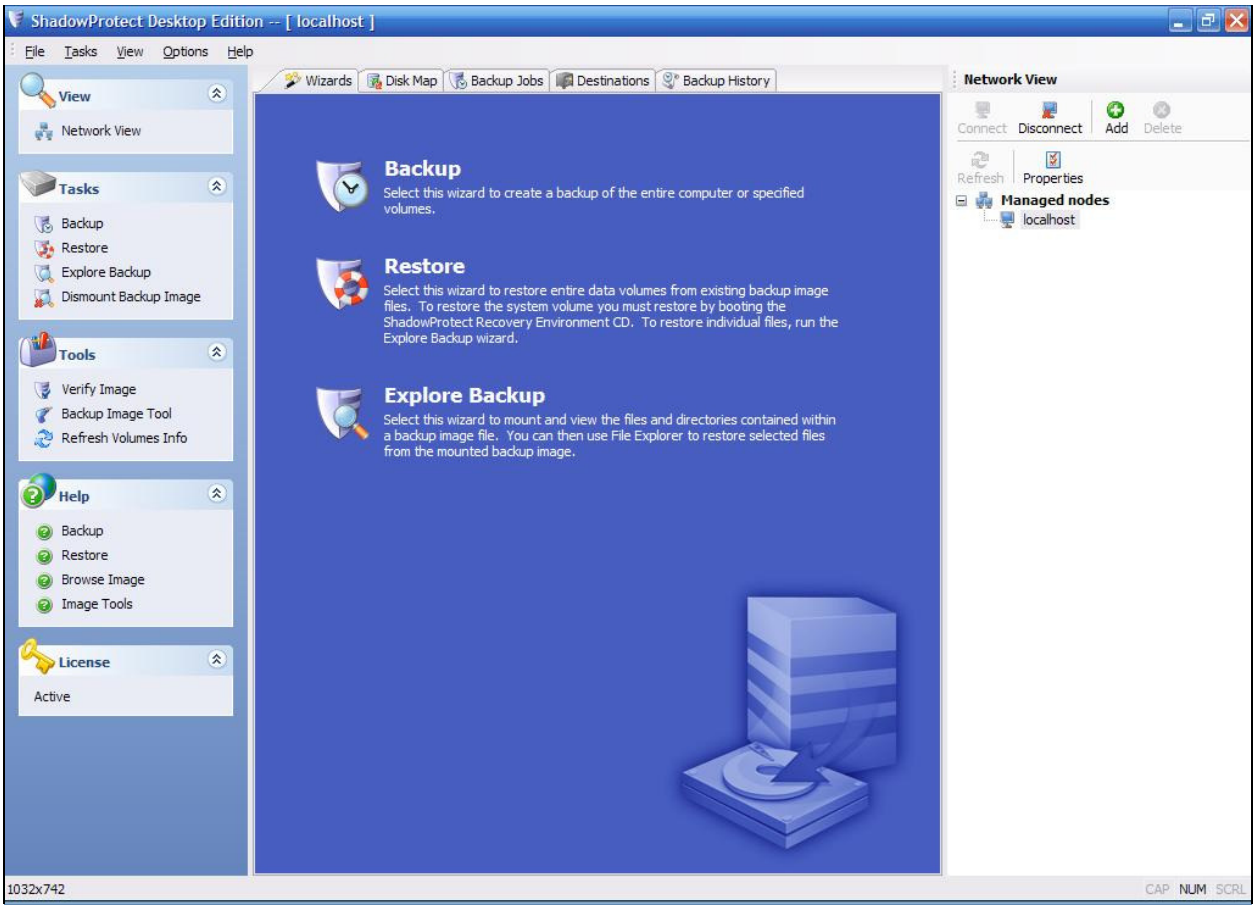

Figure 1: ShadowProtect Desktop Edition Main Page

1.2 Additional Information

For emerging issues and other resources, see the following:

- The readme.txt file included on the ShadowProtect Desktop Edition CD.
- The StorageCraft technical support website at www.storagecraft.com/support.html

This User Guide is also available from the ShadowProtect interface under the **Help** section.

A number of simplified diagrams are provided to give the user an overview and understanding of the way ShadowProtect works.

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A glossary of ShadowProtect features and general software/hardware terms is provided at APPENDIX C, page 120.

1.3 Conventions

This symbol designates information that is critical to the configuration and/or use of ShadowProtect.

1.4 How This Guide Is Organized

This guide is divided into the following chapters:

- ABOUT THE USER GUIDE
- INTRODUCTION
- INSTALLING SHADOWPROTECT
- ABOUT THE USER INTERFACE
- CREATING BACKUP IMAGE FILES
- SHADOWPROTECT
- RESTORING FILES AND FOLDERS
- DISMOUNTING BACKUP IMAGE FILES
- BACKUP IMAGE TOOL
- STORAGECRAFT RECOVERY ENVIRONMENT
- REMOTE MANAGEMENT
- OTHER OPERATIONS
- BEST PRACTICES
- PRODUCT SUPPORT
- COMMON RETENTION POLICY CONFIGURATIONS
- GLOSSARY

Familiarize yourself with the features and configuration options of ShadowProtect by reviewing this User Guide before using the product.

A Best Practices section at page 116 provides guidance on the use of ShadowProtect to help ensure a beneficial experience with the product.

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CHAPTER 2: INTRODUCTION

2.1 About ShadowProtect Desktop Edition

Fast and reliable backup and bare metal recovery for Windows Desktops and desktops.

ShadowProtect Desktop Edition is a backup and recovery solution for Windows® 2000 Server and Server 2003 computers. With ShadowProtect you can create exact point-in-time backup images while you work of an entire system including the operating system, applications, system and personal settings, and personal files. You can save these point-in-time backup images to any disk device including network drives, SAN, NAS, iSCSI, SCSI, USB or FireWire. If you experience a problem with your system or you need to recover a file, you can use a previous point-in-time backup image to restore a file, folder, or an entire volume.

ShadowProtect utilizes simple and intuitive wizards, so that you can:

- Create a backup image.
- Set up an automatic backup schedule.
- Mount a point-in-time backup image for file and folder browsing or recovery.
- Restore an entire volume.

Perform a bare metal recovery using the StorageCraft Recovery Environment.

With ShadowProtect, you can protect your system and data in the event of a disaster.

Note: The ShadowProtect CD contains the StorageCraft Recovery Environment which is used as a boot disk for restoring a backup image to the system volume. Be sure to store the CD in a safe place for use in the event that a bare metal recovery of your computer is required.

ShadowProtect enables you to:

- Create live backups while you work.
- Schedule automatic backups.
- Restore your system to an exact point-in-time.
- Restore images to different hardware or to virtual environments (P2P,P2V,V2P).
- View backup images for quick file and folder recovery.
- Save backup files to any disk device or removable media.
- Remotely recover your system and data.
- Perform a quick and simple bare metal system recovery.

New Features in ShadowProtect Version 3.0:

- Hardware Independent Restore (HIR) – Restore any backup image file to dissimilar hardware or to virtual environments such as VMWare or Microsoft Virtual Server.
- Improved Recovery Environment – Dynamically load storage and NIC drivers without rebooting. Hot plug storage devices like USB drives without rebooting.
- Save backup images to CD/DVD/Blu-Ray media.
- I/O throttling for each backup job.
- Create incremental backups ONLY – With the new forever incremental technology, you can create incrementals eliminating the need to take another full image. Auto consolidation on the image destination drive helps manage storage consumption.
- Improved Network Destination wizard.
- Verify backup images for image integrity.

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Components of ShadowProtect

ShadowProtect includes the components listed in Table 1.

Table 1: Components included in ShadowProtect

Component	Description
ShadowProtect Console	**The ShadowProtect console lets you create, schedule, and restore point-in-time backup images from your computer, manage existing backup images and manage and view the complete status of the ShadowProtect Backup Agent. The console includes numerous wizards to simplify the operation of ShadowProtect.**
ShadowProtect Backup Agent	**The ShadowProtect Backup Agent is the engine that actually creates and stores the point-in-time backup images on a computer. The Agent also is the engine that mounts and can restore files, folders or complete volumes on a computer. The Agent is managed via the console. To access the ShadowProtect Backup Agent, you must be a domain user with local administration rights.**
StorageCraft Recovery Environment	**The StorageCraft Recovery Environment allows for quick recovery from system failure. The recovery environment is based on Windows Server 2003 Service Pack 1 and Windows Vista. This has excellent device coverage for Server hardware and in most cases, all the necessary drivers are available for complete system detection and quick recovery in case of failure.** **Within the recovery environment, you can not only restore systems, but also back them up. This is useful in two cases:** • **If the system is unable to boot, ShadowProtect allows you to back that system up before a destructive restore could destroy valuable data; and** • **ExactState™ backups, which are backups of volumes that are offline, can be taken when the best possible backup or cold backup is required.** **Using the remote management and remote control capabilities, the administrator or help desk personnel can manage ShadowProtect without sitting in front of the computer. In case of system failure, the recovery environment can be remotely controlled by the administrator for full system recovery.**
ImageManager	**The StorageCraft ImageManager allows you to auto consolidate backup images and gives you information about how much storage space is being consumed by your backups.**

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2.2 How Does ShadowProtect Work?

Using StorageCraft's leading edge volume snapshot technology, image/restore engine and image mounting application, ShadowProtect creates point-in-time backup image files that represent the exact state of your system. These backup image files contain a sector-by-sector image of the volume. These backup image files may be encrypted for security and compressed to conserve hard disk space. When these backup image files are mounted using StorageCraft's image mount technology or restored, they represent an exact copy of the volume at the point-in-time the backup image was taken. The following explains each of the steps for creating backup image files, mounting and exploring backup image files and restoring image files.

Creating a ShadowProtect backup image involves two key processes; the first is creating a virtual volume and the second is capturing the volume information into a file. To create the virtual volume, snapshot technology is used to capture the volume at an exact point-in-time. By default, ShadowProtect will use StorageCraft's Volume Snapshot Manager to capture this snapshot. If you are running Windows XP and during installation you chose not to install StorageCraft's Volume Snapshot Manager, then ShadowProtect will use Microsoft's VolSnap to create a virtual volume. You should be aware that the incremental backup feature available in ShadowProtect is not available if you are using Microsoft VolSnap to create the virtual volume. Table 2 below describes and compares the different snapshot methods available in ShadowProtect.

Table 2: Comparison of Snapshot Methods Available in ShadowProtect

Snapshot	Supported Operating Systems	Incremental Image Speed	Quality	Comments
StorageCraft Volume Snapshot Manager with VSS	Windows Server 2000 Family	Fast	Best	1. VSS aware applications are managed to achieve best backups. 2. Can use script files to manage applications that are not VSS aware to improve backups.
Microsoft VolSnap with VSS	Windows Server 2003 Family	Slow	Best	1. VSS aware applications are managed automatically to achieve best backups. 2. Can use script files to manage applications that are not VSS aware to improve backups.
StorageCraft Volume Snapshot Manager direct	Windows 2000 Server Family / Windows 2003 Server Family	Fast	Good	1. Can use script files to manage both VSS and non-VSS aware applications to improve backups.

In order to create the highest quality virtual volumes for imaging, ShadowProtect incorporates Microsoft VSS when taking snapshots on Windows Server 2003 systems to prepare applications for backup. (Microsoft VSS is not available on Server operating systems before Windows Server 2003 or Windows XP.) In addition, you can instruct ShadowProtect to run script files immediately before the snapshot of the volume and immediately following the snapshot of the volume. These script files can be used to better prepare applications and the system for backup, and are particularly helpful on Windows 2000 Server systems where Microsoft VSS is not available and for Windows 2003 Server systems for non-VSS aware applications. The entire process of taking a snapshot of a volume and creating a virtual volume takes only seconds and does not interfere with the current operation of the system.

This virtual volume is then imaged to create a ShadowProtect backup image file. This image file is an exact sector-by-sector representation of the volume at the time the snapshot of the volume was taken. The amount of time it takes to write the image file depends upon the hardware of the system and the amount of data in the image file. Once the image file is written, ShadowProtect can execute a final script

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file, which can be used to copy the backup image to another hard drive or location or execute some other task.

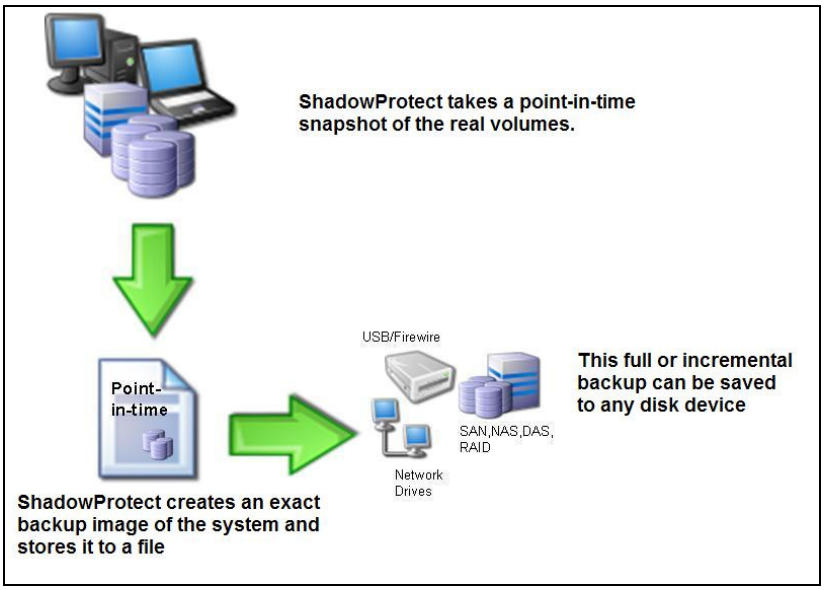
ShadowProtect takes a point-in-time snapshot of the real volumes.
USB/Firewire
Point-in-time
This full or incremental backup can be saved to any disk device
SAN,NAS,DAS, RAID
Network Drives
ShadowProtect creates an exact backup image of the system and stores it to a file

Figure 2: Creating a Point-in-time Image

Backup image files may be password encrypted for security, compressed to save disk space and split into multiple files with a defined maximum size for transfer to fixed size media such as CD or DVD.

ShadowProtect enables the user to create incremental images in which only the sectors of the changed volume are backed up. The amount of time to take an incremental image of the volume is very short, because only the changed sectors are written to the image file. This differs from file backup, where the entire file is backed up if the file changed. For large files or databases the amount of time required to create the incremental backup in addition to the amount of space required for the incremental backup can be significant.

Any changes that occur to the system after the snapshot is taken are handled in a normal fashion and are written to the real volume. These changes are tracked and the next time the system takes an incremental image, these changes will be included in the backup image file. Using this method of tracking changes and point-in-time snapshot and imaging, ShadowProtect efficiently creates backup image files with minimal impact on computer performance.

Once a backup image file is taken, a user can use it to recover files and folders by mounting the image or restoring an entire volume, including bare metal recovery of a system volume.

A user can mount a backup image using ShadowProtect's mount utility. Figure 3 describes the process of mounting backup image files. This utility includes several powerful options available when mounting a backup image, including mounting backup images as read-only, as read-writeable, as an available drive letter and as a mount point. The ShadowProtect mount utility is efficient enough to mount hundreds of backup images simultaneously with minimal impact on computer performance. Further, because these mounted backup image files have the properties of an actual Windows volume, it is possible to mount a backup image file and share it on the network as a read-writeable drive that will perform and act like an actual volume, including preserving file properties and security. Any changes made to the volume can be saved as an incremental image. Then a user can have access to critical data in the event of an emergency by working in a mounted backup image file; any changes made to the volume can be saved.

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Figure 3: Mounting a Backup Image File to Restore Files and Folders

A user can restore an entire volume using a backup image file. For non-system volumes, the user can perform a volume restore while running ShadowProtect in Windows. The user can perform a bare metal recovery of a system volume by booting to the StorageCraft Recovery Environment on the ShadowProtect CD. After the restore is complete the user can reboot to the new system volume and it will be recovered to the point-in-time that was restored. Table 3 below compares the process time required by traditional system recovery methods with the time required by the ShadowProtect method.

Table 3: Bare Metal Recovery Comparison of ShadowProtect Versus Traditional Methods

Traditional Method		ShadowProtect	
1	Repair hardware if necessary	1	Repair hardware if necessary
2	Collect all necessary OS media	2	Boot from Recovery CD
3	Reload OS from CD-ROM	3	Restore entire system or selected files
4	Reboot	4	Reboot
5	Apply multiple service packs		
6	Reboot (this could take several reboots)		
7	Reload backup software from CD-ROM		
8	Patch backup software to the latest support level		
9	Reboot		
10	Load recovery tape and restore		
FULLY RESTORED IN HOURS		FULLY RESTORED IN MINUTES	

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ShadowProtect also features an automated backup schedule that allows a user to set up automated backup jobs for protected volumes. Using the backup schedule the user may configure his computer to take full and incremental backup images and to retain backup image sets as defined. Using the backup image schedule, it is possible to schedule an incremental backup image every 15 minutes.

ShadowProtect comes with the Backup Image Tool which simplifies image management. Using this tool, a user can manage existing image files, including consolidating image files as well as modifying password encryption and compression. Finally, a user may merge or split image files into single or multiple files of fixed size for easy management or archiving to removable media such as CD or DVD.

This summary explanation is intended to provide an overall view of ShadowProtect Desktop Edition. Many important features and benefits are not included in this overview. The user is encouraged to review the User Guide in detail in order to fully understand ShadowProtect Desktop Edition.

2.3 Features of ShadowProtect Desktop Edition

Some of the features of ShadowProtect Desktop Edition are presented in the following list.

- Bootable CD to create / restore point-in-time backup
- Full system bare metal recovery
- Restore to dissimilar hardware (P2P,P2V,V2P)
- Base point-in-time backup / restore
- Read-only or read-write point-in-time backup
- Mount and view backup for folder and file recovery or update
- Verify backup images
- Point-in-time backup with compression and encryption
- Backup FAT, FAT32, NTFS volumes
- ExactState Backup – Image entire system or individual volume(s)
- Backup / restore locations – Network drives, SAN, NAS, iSCSI, SCSI, USB, or FireWire, CD/DVD/Blu-Ray
- Online backup - Entire system or individual volume(s)
- Incremental point-in-time backup
- Only create incrementals after the initial full backup.
- Auto Consolidation of base and incremental point-in-time backups into intra daily,weekly, and monthly backups.
- Schedule base and incremental backup events
- Event logging and reporting
- Remote system recovery
- Scripting and command-line support
- Microsoft Volume Shadow Copy Service (VSS) aware
- Windows 2000 Server, Server 2003 support

2.4 How You Can Use ShadowProtect Desktop Edition

2.4.1 Use Case 1 – Bare Metal Recovery

Desktops in the enterprise need to be online and available in today's global economy. In the case of a disaster causing downtime, it can be very costly to the company and reduce employee productivity while the server is offline. The server needs to be restored in the quickest and most reliable way.

Desired Solution

Restore the entire system as quickly as possible. Completely avoid reinstalling the operating system, applications and reset user preferences and settings which is too costly.

How can ShadowProtect Desktop Edition Help?

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Using the ShadowProtect Recovery Environment, IT administrators can restore the entire system in minutes. There is no need to create recovery media since ShadowProtect provides a bootable recovery CD with full hardware and network support. Point-in-time backups can be recovered from any attached storage device or storage location on your network. Restores are much faster because they are writing from disk rather than from slower tape drives. The Server is restored to *exactly* the way it was before the disaster occurred.

2.4.2 Use Case 2 – Live Desktop Backup

Disk-based backup combined with intelligent snapshot technology gives IT administrators the ability to take point-in-time backups while the server is running and without interrupting day-to-day business operations.

Desired Solution

Get a reliable backup of the Server any time during the day or night without causing any downtime.

How can ShadowProtect Desktop Edition help?

ShadowProtect allows IT administrators to take live backups of their desktops without causing any downtime. ShadowProtect takes an image – including the operating system, critical data and configuration settings – of that server. ShadowProtect also allows the IT administrator to set a schedule for the server to be automatically backed up with no intervention.

2.4.3 Use Case 3 – ExactState Backup Image File and Folder Access

Many companies make daily backups but still feel they need to have a backup of their desktops when everything is closed to ensure the likelihood that their backup is recoverable. Some companies take their desktops down at off peak times and take an image of their desktops. This can take a lot of time and be very costly for the company. However, IT administrators will choose to do this because they feel confident in the case of a disaster that the backup images they created can be recovered with this "perfect" backup.

Desired Solution

IT administrators want the most reliable and recoverable backup possible but do not want the extended downtime associated with these offline backup methods.

How can ShadowProtect Desktop Edition help?

ShadowProtect Desktop Edition provides the ability to take an ExactState backup image for the most reliable backup available and with the least amount of downtime. ShadowProtect takes a snapshot during the boot process and before any volume is online. Once the server is up and running, this snapshot is available to be imaged. This ExactState backup image allows IT administrators the best of both worlds; the most reliable backup and the least amount of downtime.

2.4.4 Use Case 4 – Individual File and Folder Restore

Restoring individual files and folders from tape can be a disaster. It takes a lot of time to locate the tape media if it is not onsite; often times the backup was never successful. Most restores that occur in the enterprise are files and folders users accidentally deleted or overwrote. This process needs to be simple and fast so end users can be productive.

Desired Solution

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Restore individual files and folders in the least amount of time possible. This process needs to be extremely easy and allow the end user to select files and folders they need to recover without any intervention from an IT administrator.

How Can ShadowProtect Desktop Edition Help?

ShadowProtect Server allows the IT administrator to mount backup images and assign the image a drive letter. Since the backups are disk-based, the process is very fast and easy and uses Windows Explorer. The IT administrator can mount a backup image and share this with end users who can select the files and folders they need to restore.

2.4.5 Use Case 5 – Update an Existing Backup Image

Many backup imaging products in the market today allow images to be taken and then mounted for easy access. The problem is these images are read-only files. Often, IT administrators need to update a single driver or an existing backup contains a virus which needs to be cleaned before restoring. Since the images are read-only, they must clean the virus or make the update, and then take another image before they restore. This method is not efficient and can cost money and time.

Desired Solution

IT administrators want the ability to update an existing image file. The backup image files should be read-write and not just read-only images.

How can ShadowProtect Desktop Edition Help?

ShadowProtect Desktop Edition creates images that may be mounted as read-only or read-write. In the case of a virus, the virus can be cleaned and the image file updated before restoring that image file to a server. The administrator may also mount an image file for end users who have lost data to use mounted volumes to continue their work as normal. The changes made to a volume can be written to a backup image as an update.

2.4.6 Use Case 6 – Create Full and Incremental Backup Images

IT administrators need the ability to take full backups – and more importantly incremental backups – to save time and space. Many solutions use a file based approach which means if a file is changed after a full backup has been taken, that entire file will be backed up in the incremental. Sector-based incremental backup is the quickest and most efficient way to take an incremental backup.

Desired Solution

Once a full backup has been taken, IT administrators would like to take incremental backups from that point forward, until the next full backup. The incremental backups must be fast and take up the least amount of disk space.

How can ShadowProtect Desktop Edition Help?

ShadowProtect Desktop Edition incremental backups are sector-based. This allows backup of just the pieces of a sector that have changed to be backup up and not the entire file. For example, if a user made a change to a Word document that was 4MB in size, with other file based backup products, the entire 4MB file would be backed up. With ShadowProtect and sector tracking, just the changed sectors would be backed up and not the entire file.

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2.4.7 Use Case 7 – Restore Backup Images to Different Hardware/Virtual Environments.

Users need to recover backup images to different types of systems. There are times when the original hardware is not available, or the user wants to migrate from a physical environment to a virtual environment. Users need the ability to take any backup image and restore it to either the same hardware, completely different hardware, or to a virtual environment.

Desired Solution

Use my existing backup images to restore to any environment, whether it is physical or virtual.

How can ShadowProtect Desktop Edition Help?

Using the HIR feature in ShadowProtect Desktop Edition 3.0, users may take their existing backup images that were created from previous versions of ShadowProtect and recover to completely different hardware or to a virtual environment. ShadowProtect backup images are supported from within the VMware Converter and VMware Workstation 6 products.

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CHAPTER 3: INSTALLING SHADOWPROTECT

3.1 Requirements

3.1.1 Minimum System Requirements

- CPU Support: 133 MHz or higher Pentium compatible CPU
- Memory: At least 128 MB of RAM (or the minimum required by the operating system)
- Hard Disk: 12 MB of free space
- CD-ROM or DVD drive

3.1.2 Supported Operating Systems

- Windows® Vista Home Basic/Home Premium/Business/Ultimate
- Windows® XP Home/Professional
- Windows® 2000 Professional

3.1.3 Supported File Systems

ShadowProtect Desktop Edition supports the following File Systems: FAT16, FAT16X, FAT32, FAT32X, NTFS and Dynamic Disks.

3.1.4 Supported Storage Media

ShadowProtect Desktop Edition supports the following storage media: any disk drive including network drives, SAN, NAS, iSCSI, SCSI, USB or FireWire or optical media including CD/DVD/Blu-Ray.

3.2 Trial Version

If you are installing the Trial Version of ShadowProtect Desktop Edition, you can install all the applications and create backup image files of system and data volumes. You can also restore data volumes or specific files and folders.

You will not be able to restore the system volume, because the StorageCraft Recovery Environment is not made available with the Trial Version. This component is made available only to customers who purchase ShadowProtect or are provided the Evaluation Version.

Your Trial Version will expire and cease to operate after the trial period. However, you can purchase ShadowProtect at any time and the images you created using the Trial Version can be restored using the Full Version of the product.

3.3 Evaluation Version

If you are installing the Evaluation Version of ShadowProtect Desktop Edition, you can install all the applications and create backup image files of system and data volumes. You can also restore system volumes, data volumes or specific files and folders.

The Evaluation Version is made available on CD or as an .ISO image. The StorageCraft Recovery Environment is made available with the Evaluation Version, enabling you to restore the system volumes as well as enabling you to create backup image files from the Recovery Environment.

Your Evaluation Version will expire and cease to operate after the evaluation period. However, you may purchase ShadowProtect at any time and upgrade your Evaluation Version to a Full Version without reinstalling the software.

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3.4 ShadowProtect Licensing

ShadowProtect licensing is based on the number of computers you are protecting using the software. If you are using ShadowProtect to backup 100 computers, you will require 100 licenses. Please review the End User License Agreement beginning at page 3 of this User Guide.

3.5 Installing ShadowProtect Desktop Edition

Before you install ShadowProtect, make sure you have reviewed the system requirements for installing ShadowProtect.

To Install ShadowProtect

1. Insert the ShadowProtect CD into the media drive of the computer.

   If CD auto-run is enabled, the ShadowProtect installation page will launch automatically.

2. If the CD auto-run is not enabled, browse the ShadowProtect CD. Locate and run the ShadowProtect installation program named Desktop_Setup_3.0.EXE.

3. Select the product you want to install (Server, Desktop, ImageManager).

4. Click Next on the setup Installation Wizard welcome screen.

5. ShadowProtect License Agreement.

   You must accept the ShadowProtect License Agreement to install ShadowProtect. Without accepting the ShadowProtect License Agreement you cannot proceed with the installation. If you wish to print out the License Agreement, click Print. If you accept the License Agreement, select the radio button indicating "I accept the terms of the terms in the license agreement." Then click Next.

   If you do not accept the ShadowProtect License Agreement, click Cancel to abort the installation.

6. Select the type of setup. If you select Complete all components will be installed. Selecting Custom will allow you choose what components to install. Click Next

7. By default, ShadowProtect will be installed in "C:\Program Files\StorageCraft\ShadowProtect\."

   You may change the installation location by clicking the Change button and browsing to the location you wish to install ShadowProtect.

8. The installation summary dialog will appear. If you need to make changes to the installation, click Back and make changes. Click Install to begin the installation.

9. A dialog box will appear indicating ShadowProtect installation is complete. Click Finish.

10. You will be prompted to restart your computer for the configuration changes to take affect. Click Yes to restart your computer now. Click No to restart your computer later.

11. Remove the ShadowProtect CD from the media drive.

To Install the ShadowProtect ImageManager

1. Insert the ShadowProtect CD into the media drive of the computer.

   If CD auto-run is enabled, the ShadowProtect installation program will launch automatically.

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2. If the CD auto-run is not enabled, browse the ShadowProtect CD. Locate and run the ShadowProtect installation program named Setup.

3.6 Testing the StorageCraft Recovery Environment CD

You should test the StorageCraft Recovery Environment to ensure that it runs properly on your computer. To do this, boot the StorageCraft Recovery Environment from the ShadowProtect CD, see *CHAPTER 11: STORAGECRAFT RECOVERY ENVIRONMENT* for details and instructions.

If the StorageCraft Recovery Environment boots and runs as expected, then you will be prepared to perform ShadowProtect operations from the Recovery Environment in the event the system does not boot or you need to restore a system volume from a backup image file or you wish to create cold state backup images using the Recovery Environment.

If the StorageCraft Recovery Environment does not boot or run as expected, you should investigate the following issues:

- You are having problems booting to the StorageCraft Recovery Environment from the ShadowProtect CD. See *CHAPTER 11: STORAGECRAFT RECOVERY ENVIRONMENT* for details and instructions on booting the ShadowProtect CD.

- You do not have the necessary network interface card (NIC) drivers to access the network. You can now dynamically load storage and NIC drivers from within the Recommended Recovery Environment option by clicking the Load Drivers button under the Tools menu. You can also contact StorageCraft Technical Support or send an email to support@storagecraft.com so that the necessary NIC drivers can be included in subsequent builds of ShadowProtect. (See ***Error! Reference source not found.***)

- You do not have the necessary storage drivers to access a storage device on the computer. You may need to load storage drivers during boot time. During the initial boot phase of the StorageCraft Recovery Environment, you will be prompted to hit F6 to add storage drivers. You will then be prompted to load the storage driver from diskette. If you choose to load the drivers after you have booted into the Recommended Recovery Environment, you can click the Load Drivers button under the Tools menu. It is a good idea to keep necessary storage drivers on a diskette that is available in the event you need to boot the ShadowProtect CD to run from the Recovery Environment. Contact StorageCraft Technical Support or send an email to support@storageCraft.com so that the necessary storage drivers can be included in subsequent builds of ShadowProtect. (See ***Error! Reference source not found.***)

Note: The ShadowProtect CD, contains the StorageCraft Recovery Environment which is used as a boot disk for restoring a backup image to the system volume. Be sure to store the CD in a safe place for use in the event that a bare metal recovery of your computer is required.

3.7 Starting ShadowProtect Desktop Edition

To start ShadowProtect from Windows, select **ShadowProtect > ShadowProtect Desktop Edition**, from **Start > Programs**. This will start ShadowProtect and bring up the user interface.
If your system is unable to boot the operating system, or you wish to run ShadowProtect from the Recovery Environment in order to restore a system volume or to take cold state backup images, See *CHAPTER 11: STORAGECRAFT RECOVERY ENVIRONMENT* for instruction and details.

3.8 Activating and Deactivating ShadowProtect Desktop Edition

When you purchase ShadowProtect, you will receive a product serial number along with the Evaluation Version of the product. After installing the Evaluation Version you will have 30 days to activate the product and convert the installed product to a Full Version before the product times out and ceases functioning.

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Online Activation (preferred method)

To activate your product online complete the following steps. This is the preferred method for computers with an internet connection.

1. Install the Evaluation Version of ShadowProtect you received when you purchased ShadowProtect.

2. Start ShadowProtect See *Section 3.7 Starting* for instructions and details.

3. From the Menu Bar select **Tools** > **Product Activation**.

4. Enter your Customer Name into the Product Activation dialog.

5. Enter your product serial number you received when you purchased your product into the Product Activation dialog.

6. Machine ID is generated automatically after installing ShadowProtect and is presented in the Machine ID field in the Product Activation dialog.

7. Click OK. You will receive a message letting you know if your activation was successful or unsuccessful.
    a. (Activation Successful) If your activation was successful, you may now close the Product Activation dialog. You product is activated.
    b. (Activation Unsuccessful) You will be notified if your product activation was unsuccessful and why it was unsuccessful. If your product was unsuccessfully activated, please review the following actions you may take to correct the issue. The error message you received from your activation attempt should provide guidance.
        i. Check all information entered into the Product Activation dialog that it is accurate. If you find an error in the information, correct the entry and click OK to resubmit the activation request.
        ii. If you received an error that the computer could not successfully communicate to the activation server or the internet, try using Web form activation or Telephone activation described later in this section.
        iii. If you received a message saying the allowed activations for the serial number have been exceeded, you must purchase additional licenses. If you feel you received this message in error, please contact StorageCraft Support at support@storagecraft.com. Product support is available during business hours between 9:00 A.M. and 5:30 P.M. (MST).
        iv. For all other activation issues, contact Storagecraft Support at support@storagecraft.com. Product support is available during business hours between 9:00 A.M. and 5:30 P.M. (MST).

Web Form Activation (alternate method)

To activate your product using the Web form activation, complete the following steps. This method should only be used if the computer you are activating does not have an internet connection or you were unable to successfully activate the product using online activation.

1. Install the Evaluation Version of ShadowProtect you received when you purchased ShadowProtect.

2. Start ShadowProtect, see *Section 3.7 Starting* for instructions and details.

3. From the Menu Bar select **Tools** > **Product Activation**. You will need the serial number you received when you purchased your product along with the Machine ID in order to request an

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activation key from StorageCraft. Machine ID is generated automatically after installing ShadowProtect and is presented in the Machine ID field in the Product Activation dialog.

4. Using a Web browser, go to the following URL and enter the requested information into the form and then click the submit button.

   http://www.storagecraft.com/products/Activation.html

5. The StorageCraft license server will validate the submission and send you an email containing the activation key to the email address you provided.

6. From the Menu Bar select **Tools** > **Product Activation**. Enter your Customer Name, Serial Number and Activation Key. Click Ok.
   a. (Activation Successful) If your activation was successful, you may now close the Product Activation dialog. You product is activated.
   b. (Activation Unsuccessful) You will be notified if your product activation was unsuccessful and why it was unsuccessful. If your product was unsuccessfully activated, please review the following actions you may take to correct the issue. The error message you received from your activation attempt should provide guidance.
      i. Check all information entered into the Product Activation dialog that it is accurate. If you find an error in the information, correct the entry and click OK to resubmit the activation request.
      ii. For all other activation issues, contact Storagecraft Support at support@storagecraft.com. Product support is available during business hours between 9:00 A.M. and 5:30 P.M. (MST).

Telephone Activation (alternate method)

To activate your product over the telephone compete the following steps. This method should only be used if the computer you are activating does not have an internet connection or you were unable to successfully activate the product using online activation.

1. Install the Evaluation Version of ShadowProtect you received when you purchased ShadowProtect.

2. Start ShadowProtect, see *Section 3.7 Starting* on doing this.

3. From the Menu Bar select **Tools** > **Product Activation**. You will need the serial number you received when you purchased your product along with the Machine ID in order to request an activation key from StorageCraft.

4. Call StorageCraft product support at (801) 545-4710. Product support is available during business hours between 9:00 A.M. and 5:30 P.M. (MST). The product support specialists will walk you through the process of activating your product.

Deactivating ShadowProtect Desktop Edition

You can deactivate your license if you are retiring your system. This will allow you to install the product on the new system and reactivate the software. To deactivate click on the Help Menu bar and select Product Activation. Click the Deactivate button and you will be presented with a message stating you can no longer use this product key on this machine. Click OK.

3.9 Uninstalling ShadowProtect Desktop Edition

To uninstall ShadowProtect:

1. From Windows, click **Start > Settings > Control Panel > Add or Remove Programs**.

2. Select ShadowProtect 3.0 and then click **Remove > Yes**.

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3. After uninstalling is complete, you must reboot your computer for the changes to take affect.

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CHAPTER 4: ABOUT THE USER INTERFACE

The ShadowProtect Desktop Edition interface provides many of the user controls and options for operating ShadowProtect and for getting the most out of the product. The user interface provides simple wizards for executing the most common tasks like backing up a system, scheduling a backup job, restoring a system, mounting existing backup images and dismounting backup images.

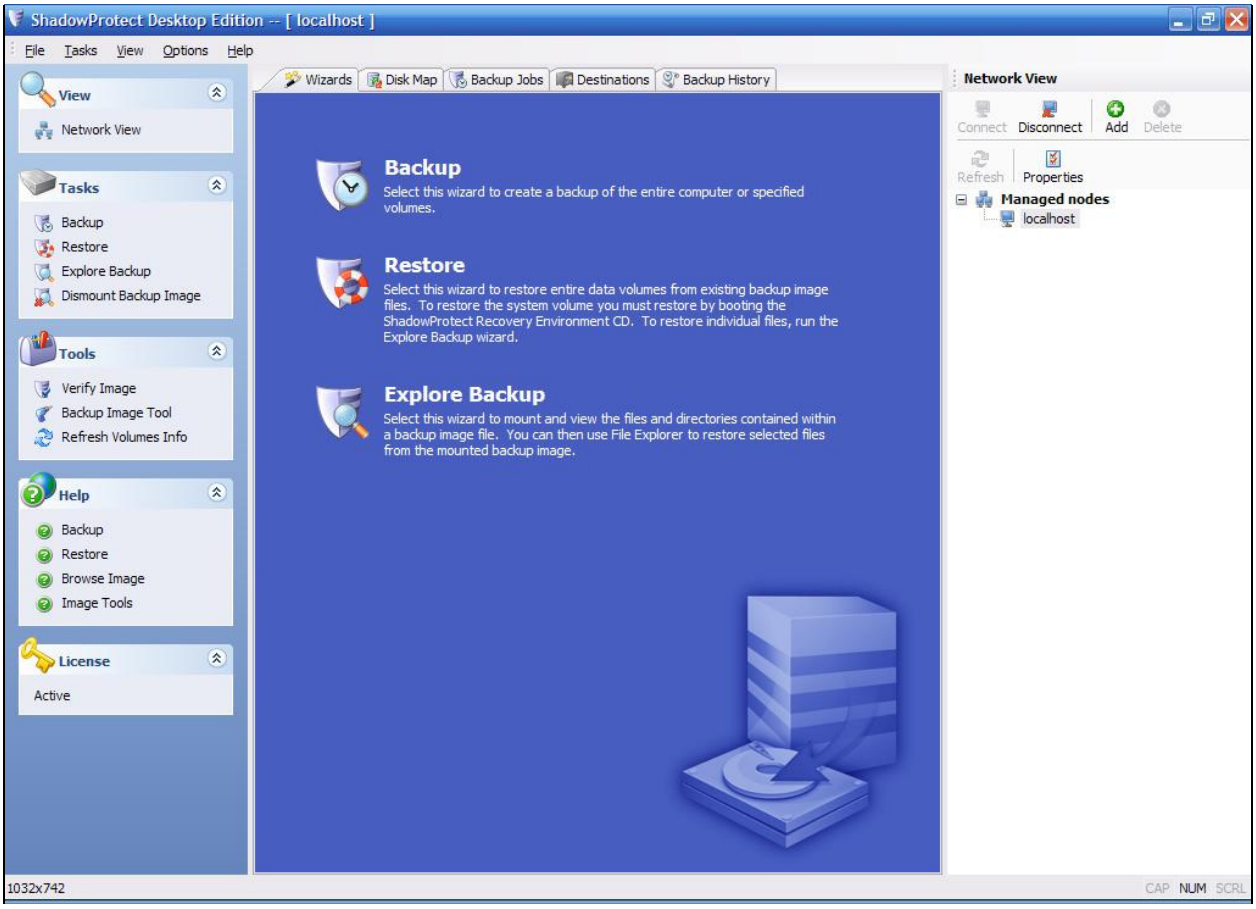

Figure 4: ShadowProtect Main Screen

The main screen is separated into three panels. The navigation panel to the left gives the user the option to perform all of the tasks and run the tools available in ShadowProtect. It is separated into five sections: View, Tasks, Tools, Help and License. Depending on what you select you can:

- Open the network view
- Backup a volume
- Schedule a backup job
- Browse or restore files
- Mount an image file
- Dismount an image file
- Change the compression and encryption options of an existing image file.

The center panel of the main screen has three main wizards to guide users through the most common tasks. At the top of the center panel are tabs which include Wizards for running the most common tasks, a Disk Map, Backup Jobs, Destinations and Backup History. In addition, when a backup, restore or

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maintenance job is running, information about the specific job is presented in a tab named Volume Backup, Volume Restore or Image Maintenance, specific to each volume and job type.

The right panel or Network View Panel, which can be hidden or presented by clicking Network View, allows for control of the ShadowProtect Backup Agent on other computers on the network. From the Network View Panel, you can add computers, remove computers and review the properties of a selected computer including information such as computer name, address on the network, description of the computer and current status. Properties will also display the authorization settings for the selected computer.

4.1 About the Menu Bar

The menu bar provides quick access to the commonly used features of ShadowProtect, toggle switches to customize the view of the ShadowProtect user interface as well as tools such as email notification options and the ShadowProtect registration dialog required to fully activate ShadowProtect.

4.1.1 File

4.1.1.1 Exit

Select this option to close the ShadowProtect user interface. Note the ShadowProtect service will continue to run and any scheduled backup jobs will be performed whether or not the user interface is open. You can alternatively close the ShadowProtect user interface by clicking the red “X” in the upper right-hand corner of the user interface. Clicking the red “X” will minimize the user interface into the tray icon at the lower right. Right clicking on the tray icon allows you to open the Backup Wizard, Restore Wizard, Explore Backup Wizard, Hide the tray icon, or Exit the product.

4.1.2 Tasks

4.1.2.1 Backup

Selecting this option starts the Backup Wizard allowing you to backup the entire server, desktop or laptop, or select individual volumes to backup. You can also set a schedule to automatically backup your systems.

4.1.2.2 Restore

Selecting this option starts the Restore Volume Wizard. This wizard walks you though restoring the entire system or selecting individual volumes to restore. Restoring the system volume must be performed from the StorageCraft Recovery Environment.

4.1.2.3 Explore Backup

Selecting this option starts the Explore Backup Wizard which will guide you through restoring individual files and folders or browsing an existing image file.

4.1.2.4 Dismount Backup Image

Selecting this option starts the Dismount Backup Image Wizard which will guide you through dismounting an image file that has been previously mounted.

4.1.2.5 Verify Image

Selecting this option starts the Verify Image Wizard. This wizard will guide you through verifying a backup image or a backup image set.

4.1.2.6 Backup Image Tool

Selecting this option starts the Backup Image Tool Wizard. This wizard will guide you through modifying image options such as compression, encryption and image split functions.

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4.1.2.7 Add Destination

Selecting this option opens the Backup Destination dialog. See *Section* ***Error! Reference source not found. Error! Reference source not found.*** for additional information.

4.1.2.8 Refresh Volumes Info

Selecting this option will refresh the volumes list for the system.

4.1.3 View

4.1.3.1 Toolbars

Selecting this option launches the Customize tool bar dialog. Using this feature, you can create customized tool bars for use with ShadowProtect.

4.1.3.2 Status Bar

This option toggles the status bar "visible" and "hidden." The Status Bar is located along the bottom of the user interface.

4.1.3.3 Task Panel ("Left Panel")

This option toggles the task panel between "visible" and "hidden." For additional information on The Task Panel or Left Panel (see *Section 4.2 About the Left Panel*).

4.1.4 Options

4.1.4.1 Agent Options

Selecting this option displays the Agent Options dialog. Using this dialog, you can send email on a per machine basis based on either a successful job execution or an unsuccessful job execution. To use the email notification you must specify an SMTP server, an email address to send from, an email address to send to and you must specify whether you want email notification sent on a per event basis for each successful and/or each unsuccessful job execution. By default, the email notification is off for both successful and unsuccessful backup job execution.

4.1.5 Help

4.1.5.1 Contents

Selecting this option launches the online help and ShadowProtect User Manual.

4.1.5.2 About ShadowProtect . . .

Selecting this option displays the ShadowProtect product version copyright. There is also a System Info button that will display the system information for the computer. Click the OK button to close the dialog.

4.1.5.3 Product Activation

Using this option, you can fully activate or deactivate your product. See *Section 3.8 Activating and Deactivating* for detailed instructions for activating your product.

4.1.5.4 Check for Latest Version

Using this option, you can check for an updated version of the current product. If there is an update available, you will be able to view a link where you can download the latest software.

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4.2 About the Left Panel (Task Panel)

4.2.1 View

The Network View panel presents information on remote nodes running the ShadowProtect Backup Agent. For additional information on the managing remote nodes see *CHAPTER 12: REMOTE MANAGEMENT*.

4.2.1.1 Network View

Network View toggles the right panel between exposed and hidden. The network view shows the nodes that are attached to the ShadowProtect client and can be managed by switching the client node. You can review client node information as well as add or delete nodes. By default this is turned off for the Server Edition.

4.2.2 Tasks

The tasks section of the main screen is where you can start the wizards for each of the major functions for ShadowProtect. If you click on the Tasks section in the top menu bar you will see additional tasks.

4.2.2.1 Backup

Selecting this option starts the Backup Wizard allowing you to backup the entire server, desktop or laptop, or select individual volumes to backup. You can also set up a schedule to backup your system automatically.

4.2.2.2 Restore

Selecting this option starts the Restore Wizard. This wizard walks you though restoring the entire system or selecting individual volumes to restore. Restoring the system volume must be performed from the StorageCraft Recovery Environment.

4.2.2.3 Explore Backup

Selecting this option starts the Restore Backup Image Wizard which will guide you through restoring individual files and folders or browsing an existing image file.

4.2.2.4 Dismount Backup Image

Selecting this option starts the Dismount Backup Image Wizard which will guide you through dismounting an image file that has been previously mounted.

4.2.2.5 Verify Image

Select this option to verify a backup image or a backup image set.

4.2.2.6 Backup Image Tool

Using this utility, you can make changes to existing backup images, such as change the compression option, incorporate password encryption, split image files into multiple smaller files or consolidate incremental backup image files.

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4.2.2.7 Add Destination

Using this utility, you can create a destination location to store your backup image files. You can store backup images to either a network location or to a local directory on that system.

4.2.2.8 Refresh Volumes Info

Select this option to verify a backup image or a backup image set.

4.2.3 Tools

4.2.3.1 Verify Image

Select this option to verify a backup image or a backup image set.

4.2.3.2 Backup Image Tool

Using this utility, you can make changes to existing backup images, such as change the compression option, incorporate password encryption, split image files into multiple smaller files or consolidate incremental backup image files.

4.2.3.3 Refresh Volumes Info

Select this option to verify a backup image or a backup image set.

4.2.3.4 Network Configuration

The Network Configuration Utility is a simple tool you can use to configure your network interface cards, TCP/IP settings and domain information to recover or create images to a network device. This tool is available only from the StorageCraft Recovery Environment.

4.2.3.5 HIR Configuration

The Network Configuration Utility is a simple tool you can use to configure your network interface cards, TCP/IP settings and domain information to recover or create images to a network device. This tool is available only from the StorageCraft Recovery Environment.

4.2.3.6 Load Drivers

Use this option to dynamically load storage and NIC drivers. You can add a path to the INF files for the drivers you want to load. Drivers can be pulled from floppy disks, hard drives, USB/Firewire drives or CD/DVD media.

4.2.3.7 File Browser

A simple and intuitive tool for browsing the files and folders of a backup image. This tool is available only from the StorageCraft Recovery Environment.

4.2.3.8 Text Editor

A simple and easy to use Text Editor. This tool is available only from the StorageCraft Recovery Environment.

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4.2.3.9 Vista BCD

This tool enables you to edit the BCD on systems running Windows Vista. This tool is available only from the StorageCraft Recovery Environment.

4.2.3.10 Partition Table Editor

A simple and easy to use Partition Table Editor. This tool is available only from the StorageCraft Recovery Environment.

4.2.3.11 UltraVNC

Easy to use software that can display the screen of another computer (via internet or network) on your own screen. The program allows you to use your mouse and keyboard to control the other PC remotely. This software enables you to work on a remote computer, as if you were sitting in front of it, from your current location. The UltraVNC tool is only available from the StorageCraft Recovery Environment.

4.2.3.12 Select Your Time Zone

Allows you to adjust the time zone for a system running in the StorageCraft Recovery Environment. This feature is important to ensure that the time stamping of backup image files is accurate. This tool is available only from the StorageCraft Recovery Environment.

4.2.3.13 Enable Logging

This allows you to enable logging in the recovery environment. You can specify a folder you want to save the log files to.

4.2.4 Help

Help gives you general information tips and hints on how to use specific functions of ShadowProtect. You can select from multiple topics.

4.2.5 License

The License section will show you how many days you have left to trial the product before you need to activate. If you have already activated the product, you will be able to see that the product has been activated.

Note: The Help topics and license information are not available when running ShadowProtect from the StorageCraft Recovery Environment. It is recommended that you print a copy of the User Guide to have available while running in the StorageCraft Recovery Environment.

4.2.6 Status

The Status feature is only available from the StorageCraft Recovery Environment. The Status section provides a quick view of the current state of the system, including:

Queued Tasks – Indicates the number of queued tasks waiting to be run.

Running Tasks – Indicates the number of tasks running at that time.

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4.2.7 Info

The Information section is only available while running ShadowProtect from the StorageCraft Recovery Environment. The Info section displays the Computer Name, I.P. Address and Time Zone.

4.3 About the Center Panel (Tab Panel)

4.3.1 Wizards

This tab contains shortcuts to the most commonly used wizards.

4.3.1.1 Backup

Selecting this option starts the Backup Wizard allowing you to backup the entire server, desktop or laptop, or select individual volumes to backup. You can also set up a schedule to backup your system automatically.

4.3.1.2 Restore

Starts the Restore Wizard for restoring a volume from a backup image file. See *CHAPTER 8: RESTORING BACKUP IMAGE FILES* for additional information.

4.3.1.3 Explore Backup

Starts the Explore Backup Wizard. See *CHAPTER 7: RESTORING FILES AND FOLDERS* for additional information.

4.3.2 Disk Map

The Disk Map portrays a graphical view of your drives. You can right click on a selected volume and select Backup or Restore to start the Backup Wizard or the Restore Wizard. You can also change the partition creation policies for that drive. While running the Disk Map view in the Recovery Environment, you can also run Check Disk and Format a drive.

4.3.3 Backup Jobs

The Backup Jobs tab is where all the tools and controls for creating, deleting, reviewing, manually executing and modify backup image jobs are located.

By right clicking the mouse on a backup job, you can quickly select to execute a full, differential or incremental backup image, edit the backup job triggers or to delete the backup job.

4.3.3.1 Execute

Executes the selected backup job. You can execute full, differential or incremental backup jobs from here.

4.3.3.2 Cancel

Cancels the selected backup job.

4.3.3.3 Pause

Toggles a jobs status between enabled and disabled.

4.3.3.4 New

Starts the Backup Job Wizard. See *Section 5.9 Scheduling Backup Jobs* for additional information.

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4.3.3.5 Delete

Deletes the selected backup job.

4.3.3.6 Edit

Allows you to edit the selected backup job's schedule.

4.3.3.7 Details

Opens a tab at the bottom of the panel showing the progress and status for the selected job.

4.3.3.8 Refresh

Refreshes the volume information in the Backup Job Information pane.

4.3.3.9 Basic Properties

To get additional detail about a backup job, such as the source volume, destination location, image name, compression level, encryption used and schedule, highlight a backup job. The information will be presented in the pane below the backup jobs list in the Basic Properties tab.

4.3.3.10 Volume Backup Details

To get details on a backup job that is currently running (if no backup job is currently running the most recent backup job will be presented) highlight a backup job and select Details. Information about the job is presented, including: time remaining, throughput and ShadowProtect details about the job.

4.3.4 Destinations

This tab has all the commands necessary for creating, editing, deleting and reviewing Destination locations. For more information see *Section* ***Error! Reference source not found. Error! Reference source not found.***.

4.3.4.1 Add

Starts the Destination dialog. See *Section* ***Error! Reference source not found. Error! Reference source not found.*** for additional information.

4.3.4.2 Delete

Deletes the selected destination location.

4.3.4.3 Edit

Opens the dialog screen that allows you to edit a destination objects path or credentials. See *Section 5.7.1.2 Editing Destination* for additional information.

4.3.4.4 Refresh

Clicking the Refresh button refreshes the information in the Destination Objects List and the Destination Objects Information List.

4.3.4.5 Destinations List

This is the list of Destination locations defined for the computer. To delete or edit a destination location, highlight the destination location in the list and then select the operation to perform. Information about backup image sets stored at the destination location is presented for the highlighted entry in the Destination Information.

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4.3.4.6 Destination Information

Provides details about what backup sets are stored for the highlighted entry in the Destinations List. Information includes: Base Name, First Image Creation Time, Last Image Creation Time and number of Points-in-time images in the backup image set.

4.3.5 Backup History

ShadowProtect allows users to view the logs of each backup job. The backup history can provide information about scheduled backup job results, including reasons for failure, if any. To review the backup history, select the Backup History tab from the center panel of the main screen.

4.3.5.1 Delete All

Deletes all entries from the backup history.

4.3.5.2 Details

Presents the backup history details for the selected entry in the backup history. The details are provided in a pane below the backup history log.

4.4 About the Right Panel (Network Panel)

The Network view contains information for managing ShadowProtect on remote computers. For additional information on managing remote nodes see *CHAPTER 12: REMOTE MANAGEMENT*.

4.4.1 Connect

Connects a previously added managed node to the ShadowProtect user interface.

4.4.2 Disconnect

Disconnects a managed node from the ShadowProtect user interface.

4.4.3 Add

Adds a computer which has the ShadowProtect Backup Agent installed to the Managed Nodes. For more information on adding a managed node, see *Section 12.3 Adding Remote Nodes*.

4.4.4 Delete

Deletes a node from the managed node list. To delete a node, highlight the node you wish to delete and then select Delete.

4.4.5 Properties

The Properties button toggles the properties information table on and off. The properties table includes the following information: computer name, computer address, computer description, computer status (connected or disconnected), domain name, user name and password.

4.4.6 Managed Nodes

The Managed Nodes presents a complete list of the managed nodes. You can connect or disconnect a node to manage ShadowProtect for that node.

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CHAPTER 5: CREATING BACKUP IMAGE FILES

In order to protect your system and data you must create point-in-time backup images that you can use in the event a problem occurs. By using ShadowProtect, you protect your system and data on a volume-by-volume basis. So, when you take backup images of a specific volume, you will have the ability to mount the images and view the contents as if it were a real volume. In the event that you need to recover data, you can recover specific files and folders from the image or you may recover the entire volume to the exact point-in-time that the backup image was taken.

5.1 What is a Backup Image File

A backup image file is an exact point-in-time representation of a computer volume. This representation is not a file copy of the volume, but rather it is a sector-by-sector duplicate copy of the volume. When this file is mounted using the ShadowProtect mount utility, the contents of the file are presented as a volume or as a mount point. You may browse the contents and open files and folders just like you would a regular volume. With ShadowProtect writeable images, you can even open files, make changes and have those changes saved as a backup image file.

5.2 ShadowProtect File Types

ShadowProtect uses three types of files with the following file type extensions, .spf, .spi and .sp(number). Each of these types of files is described in Table 4 below

Table 4: ShadowProtect File Types

File Type Extension	Description
.spf	Full image files. These are the files associated with full images.
.spi	Incremental or differential image files. These files are generated when you create an incremental or differential backup image. These files are dependent upon the full image file and any prior incremental or differential image files. These image files represent only the changed sectors relative to the image file they are generated against. An incremental image file is also created when an image is mounted as read/write and changes are saved to the image file.
.sp(number)	Image files that belong to a spanned image set. Spanned image sets are made by breaking the image into smaller sizes for increased manageability. For example, breaking an image into files to be saved onto multiple CDs. The number represents the sequence the file represents within the spanned image set.
-cd.spi -cw.spi -cm.spi	Image files that have been automatically collapsed by the ImageManager will have this type of extension. The files will be either daily, weekly or monthly collapsed backup files.
.spk	This file is created when you use password key files to encrypt data.

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5.3 File Naming Conventions

ShadowProtect backup image files follow a naming convention that helps the user identify the file and its relationship and dependencies on other backup image files. The structure for the file is a volume identifier separated by a date, the full image sequence number followed by a dash, the differential sequence number followed by a dash and the incremental sequence number followed by the file suffix which indicates whether the file is a full or differential/incremental image file by using the extensions .spf or .spi respectively. By default, ShadowProtect will use the drive letter followed by an underscore ("_") followed by "Vol" as the volume identifier, e.g., C_Vol to represent the C:\.

{Volume Identifier}-b{sequence}-d{sequence}-i{sequence}.{ShadowProtect extension}

The Table 5 below presents examples of ShadowProtect image file names with a description of the image file providing the reader a better understanding of the file naming nomenclature.

Table 5: Examples of Backup Image File Names with a Description of the File

File Type Extension	Description
C_Vol-b001.spf	Full image of the C:\ volume
C_Vol-b001-d001-i000.spi or C_Vol-b001.d001.spi	Differential image of the C:\ volume with a dependency on the full backup image file C_Vol-b001.spf *See the note below for more information about file name segments containing "000."*
C_Vol-b001-d000-i001.spi or C_Vol-b001-i001.spi	Incremental image of the C:\ volume with a dependency on the full backup image file C_Vol-b001.spf *See the note below for more information about file name segments containing "000."*
C_Vol-b001-d001.i001.spi	Incremental backup image file of the C:\ volume with a dependency on the differential backup image file C_Vol-b001-d001.i000 which in turn has a dependency on C_Vol-b001.spi

Note: Backup image file names that have a "-d000" or "-i000" segment use these name segments only as place holders, and indicate that a differential backup image or an incremental backup image are not part of the image and the backup image file has no dependency on a previous differential or incremental backup image file.

5.4 File Dependencies

By examining the file name it is possible to discern that a backup image file is dependent on other files. However, it is not possible to discern whether a backup image file is independent from other files. It is possible to generate a backup image incremental or differential against any backup image file. It is therefore critical to use the Backup Image Tool to review dependencies prior to moving, modifying or deleting backup images. For more information on the Backup Image Tool and how to review a backup image files dependencies see *CHAPTER 10: BACKUP IMAGE TOOL*.

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Note: If you delete a backup image that other point-in-time backup image files are dependent upon, you will render the dependent backup image files useless. You will not be able to browse and restore files using these dependent backup image files.

Note: If you delete the full image to an active backup image job, the job takes another full image during the next scheduled backup and will start a new backup image set.

5.5 *Backup Image File Options*

5.5.1 Backup Image Files (Full, Differential and Incremental)

ShadowProtect takes three types of backup images; full, differential and incremental backup images. Each of these backup image types is described in Table 6 below.

Table 6: Full and Incremental Backup Image Files

Backup Images	Description
Full	Represents a disk volume at a point-in-time and does not rely on any other files.
Incremental	Represents only the changed sectors of the volume since the last full or incremental backup was taken. Each incremental backup image is dependent on all prior incremental backup images and the full backup image related to the backup job. By selecting to mount or restore an incremental backup image, you are incorporating the contents of the full backup image and any prior incremental backup images to create a complete representation of the volume at the point-in-time of the incremental image you are using. Because incremental backup images only involve the changed sectors, these backup images can be written very fast compared to full or differential backup images. Further, incremental backup images require very little drive space compared to a full backup image file.
Differential	Represent the changes relative to another backup image file. Differential backup images can be taken against a full backup image. You can also create a differential against a differential and its associated base image or against an incremental backup image and its dependent image files. A differential backup requires approximately the same amount of time to generate as a full backup image, but will require less space since it only consists of the changed sectors relative to the image file the differential was generated against.

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Table 7 compares the advantages and disadvantages of full backup images with the advantages and disadvantages of full backup images with incremental backup images.

Table 7: Full Backup Images and Full with Incrementals Backup Images - Advantages and Disadvantages

Backup Images	Description

Full Only	A full backup image has the following advantages and disadvantages:
	• Advantages
	  ○ Complete volume backup
	  ○ No dependencies
	• Disadvantages
	  ○ Takes more time than incremental image files
	  ○ Requires more storage space versus incrementals

Full with Incrementals	A full backup image with incremental images has the following advantages and disadvantages:
	• Advantages
	  ○ Very Fast backup
	  ○ Minimizes storage space
	• Disadvantages
	  ○ Dependent on full base and prior incremental images files

5.5.2 Storage Location to Write Backup Image Files

ShadowProtect allows you to store your backup image files to any disk device such as local disks, USB/FireWire drives, network drives and NAS devices. You can also store backup images to optical media such as CD/DVD or Blu-Ray discs. Each location has some benefits and some disadvantages.

Table 8 shows the advantages and disadvantages of each storage location option.

Note: If you select a destination that does not have enough disk space to save the backup image, the backup job will fail due to lack of storage space at the destination. Also, the ShadowProtect logs will indicate the reason the backup job did not complete successfully was due to a lack of storage space at the destination location.

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Table 8: Advantages and Disadvantages for Various Storage Locations

Location	Advantages	Disadvantages
Local Hard Drive	• Fast backup and restore • Inexpensive because drive space can be recycled	• Consumes disk space • Vulnerable to loss if the hard drive fails
Local USB/FireWire Drive	• Fast backup and restore • Preserves disk space on local drive • Inexpensive because drive space can be recycled • Easy off-site storage	• Drives are expensive
Network Hard Drive	• Fast backup and restore • Protection from local hard drive failure • Off-site storage	• Must have supported network interface card drivers for StorageCraft Recovery Environment • Network rights management. User must have network rights to save and access backup images.
CD/DVD/Blu-Ray	• Good media for archiving • Protection from local hard drive failure	• Slower backups due to media speeds • Cannot store as much data due to size restrictions

5.5.3 Compression Level

When you create a backup image file, either manually or through a scheduled job, you can choose the compression level for the backup image file. Table 9 below describes the compression levels available.

Table 9: Backup Image File Compression Levels

Compression Level	Description
None	This option does not compress the data. This is useful in cases where disk space is not an issue and you want to get a fast backup of your data.
Standard	This option will compress the data by about 40% in typical cases. This is the default compression and is recommended for the right amount of speed and disk space consumption.
High	This option will compress the data by about 50% on average.

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	This option takes the longest amount of time to perform and uses the most system resources. This option is best used when disk space is very limited.

5.5.4 Password Encrypting Backup Image Files

When you create a backup image file, either manually or through a scheduled job, you can choose to protect the file using password protection and encryption of the backup image file. This is useful if the backup image files will be stored on a network or removed off-site and you need to protect against unauthorized access and use. If you select to protect the backup image file, you must specify the correct password in order to mount or restore the backup image.

When you enter a password for the backup image file, you may use alpha and numerical characters. You must confirm the password by typing it again.

Note: Passwords are case sensitive. When you mount or restore a password encrypted backup image file, ShadowProtect will prompt you for the password. If you do not enter the correct password, or you forget the password, you will not be able to access the backup image file. Make sure the password is stored in a secure location. StorageCraft has no method for gaining access to encrypted backup image files.

You can select from three methods when encrypting a backup image file.

RC 4 128 bit (Fast) – this encryption option is faster than AES 128 bit, but the resultant image is less secure.

AES 128 bit (More Secure) – this encryption option is more secure than RC 4 128 bit, but will require longer to encrypt the image.

AES 256 bit (Most Secure) – this encryption option is the most secure but will also require the most time to encrypt the image file.

In addition to bit strength, the password used can affect the security. The following guidelines apply to ensure greatest security with password encrypted backup image files.

- Use at least eight characters.
- Use a random mixture of characters, upper and lower case and numbers.
- Don't use a word found in the dictionary.
- Change your password regularly or if you suspect your password has been compromised.

5.5.5 Password Encrypting Backup Image Files Using a Key File

You can use password key files to encrypt the backup data. This is helpful if you are not managing your own backups and you don't want other users to have access to the actual data in the image files. To set up a key file you must use the ShadowProtect KeyFileMaker tool. You can access this tool by clicking START→Programs→ShadowProtect→KeyFileMaker. You can set a password for the key file and choose to associate the key file with a particular image set or create a generic key. The key file is mainly used in conjunction with the ImageFile Manager tool.

5.5.6 Splitting a Backup Image File into Smaller Files

You can split a backup image file into multiple smaller image files. Splitting a backup image file into smaller files is useful for moving the files onto fixed length media such as CD or DVD.

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You can split a backup image file at the time you create the file, either manually or during a scheduled backup job. You can also split an existing backup image file using the Backup Image Utility.

If a backup image file is divided into multiple files, the filename suffix will change to sp1, sp2 and so forth, where the number represents the sequence the file represents within the spanned image set.

5.5.7 Backup Comments

You may attach backup comments to a backup image file. These comments are available for review when mounting or restoring the backup image file at a later date. By default the time and date stamp are added to the backup image.

5.6 Advanced Backup Image File Options

The following advanced options are available when manually creating a backup image or when scheduling a backup image job. It is recommended that you leave all advanced options on their default setting unless you fully understand how the features work. On the backup tab of the advanced options you have several tabs with options on each tab. Depending on the type of backup you select, you will see different advanced options.

5.6.1 Backup Advanced Options

5.6.2 Include Free Space

Selecting this option will backup all sectors on the volume including the sectors in the free space of the volume. The default setting for this feature is “Off.”

5.6.3 Performance Throttling

You can specify how much you want to throttle the I/O ShadowProtect will use. You can simply use the slider bar to adjust the performance. This option is turned “On” by default.

5.6.4 2nd and Subsequent Full Backups are Differentials

By turning this feature “On,” the scheduled backup job will take differentials generated using the first full backup image and the current volume in place of a full backup image for the second and subsequent backup scheduled full backup images. By using this feature it is possible to retain more point-in-time histories while consuming less storage versus taking a full backup image each time. The default setting for this feature is “Off.”

5.6.5 Image Advanced Options

5.6.6 Enable Write Caching

By turning this option “On,” ShadowProtect will use file caching when writing the backup image file. Turning this option on may slow down the imaging process. The default setting for this feature is “Off.”

5.6.7 Enable Concurrent Task Execution

By turning this option “On,” ShadowProtect will create the backup images simultaneously for multiple volumes instead of creating the backups serially. It is recommended that you have the hardware capable of performing this type of high load on the hard disks. The default setting for this feature is “Off”.

5.6.8 Enable Self-healing Incremental Recovery

This feature dictates how the scheduled backup job will react to a dirty shutdown. If this feature is “Off,” and the computer has a dirty shutdown that interrupts ShadowProtect’s incremental tracking feature, ShadowProtect will generate a new image set by taking a full backup image. However, if this image is set to “On,” then ShadowProtect will create the scheduled incremental image as planned for the scheduled

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backup job, however, it will achieve the backup image by creating a differential backup image against the most recent incremental and current volume. By turning this feature "On," the backup schedule is not disrupted. However, the CPU and network bandwidth can increase versus just initiating a new backup image set. The default setting for this feature is "On."

5.6.9 Auto Execution of Unexecuted Task

Enabling this option will allow the last taks to be automatically executed if it was missed. This option will only perform the last unexecuted task. It will not catch all the way up if it has missed more than one task.

5.6.10 Commands Advanced Options

5.6.11 Pre-Snapshot, Post-Snapshot and Post-Backup Commands

You can specify command files (.exe, .cmd, .bat) to be automatically executed at three key points in the process of creating a backup image file. These points are:

Pre-Snapshot – commands or batch files to be executed prior to taking the snapshot. An example of a pre-snapshot command file is placing non-VSS aware applications or databases into a backup state.

Post-Snapshot – commands or batch files to be executed after taking the snapshot. An example of a post-snapshot command file is returning an application or database that was quiesced using the pre-snapshot commands to full production.

Post-Backup – commands or batch files to be executed after writing out the backup image file. An example of a post-backup command file is executing a copy of the just completed backup image file to another location such as offsite or to a FTP location.

For example, you might want to place a non-VSS aware database into a backup state using the pre-snapshot command file. Once the snapshot is taken, you could return the database to production state by using the post-snapshot command file. Finally, you might use the post-backup command file to copy the backup image to a remote location.

The options for using command files to improve backup images and control of the system during the backup process is limited only by the time allotment of five (5) minutes to complete each command file and each command file must run without any interaction.

Note that on the post-backup command file, you may call a command file that executes another command file and then finishes. You may complete the ShadowProtect associated command files in the five-minute allotment and the command file that was called can carry out the longer processes of synchronizing or copying the backup image files to an alternate location or executing some other process such as virus scanning that would require longer than five minutes to complete.

To use the command files, enter the full path for the commands or batch files into the appropriate fields.

Note: ShadowProtect will allow up to five minutes for completing commands or batch files at each stage. If the commands or batch files do not finish executing in the allotted time, ShadowProtect will proceed with the command files still executing.

Note: The amount of time required to take a snapshot is only a few seconds. So any databases or applications that were quiesced or placed in a backup state with a pre-snapshot command will only be in such a state briefly before they may be placed back into their full production state with the execution of a post-snapshot command.

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Note: The command files you specify to execute cannot depend on any user interaction. You should test all command files you intend to use with a backup job before using them with ShadowProtect.

5.6.12 Encryption Advanced Options

When you create a backup image file, either manually or through a scheduled job, you can choose to protect the file using password protection and encryption of the backup image file. This is useful if the backup image files will be stored on a network or removed off-site and you need to protect against unauthorized access and use. If you select to protect the backup image file, you must specify the correct password in order to mount or restore the backup image.

When you enter a password for the backup image file, you may use alpha and numerical characters. You must confirm the password by typing it again.

Note: Passwords are case sensitive. When you mount or restore a password encrypted backup image file, ShadowProtect will prompt you for the password. If you do not enter the correct password, or you forget the password, you will not be able to access the backup image file. Make sure the password is stored in a secure location. StorageCraft has no method for gaining access to encrypted backup image files.

You can select from three methods when encrypting a backup image file.

RC 4 128 bit (Fast) – this encryption option is faster than AES 128 bit, but the resultant image is less secure.

AES 128 bit (More Secure) – this encryption option is more secure than RC 4 128 bit, but will require longer to encrypt the image.

AES 256 bit (Most Secure) – this encryption option is the most secure but will also require the most time to encrypt the image file.

In addition to bit strength, the password used can affect the security. The following guidelines apply to ensure greatest security with password encrypted backup image files.

- Use at least eight characters.
- Use a random mixture of characters, upper and lower case and numbers.
- Don't use a word found in the dictionary.
- Change your password regularly, particularly if you suspect your password has been compromised.

5.6.13 Retention Advanced Options

You can select to use a retention policy for your backups. You can select the amount of backup sets to keep before the oldest set will be deleted saving you disk space. You may also choose to delete both the full and incremental backups or to keep the full backups and only delete the incremental backups. The Retention tab is not available if you are using the Continuous Incremental backup schedule. To manage the storage space of your backups with this option, please use the ImageManager.

5.7 Other Operations

5.7.1 Destinations

Backup destinations are designed to simplify creating and editing backup jobs. By defining a backup destination, either locally or on a network, you can use this previously defined location when creating scheduled backup jobs or running manual backups.

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In the future, if you decide to change the backup location of your backup jobs or the network path or credentials change, you can make a modification to the destination object rather than deleting and recreating new backup jobs.

5.7.1.1 Steps for Creating a Backup Job Destination

1. To create a backup job Destination, select the Destinations tab from the center panel of the main screen and then select Add. This will open the Destination dialog (see Figure 5). You can also open the Destination dialog to create a new backup job Destination when creating a scheduled backup job.
    - For Destination Type, select either Local Directory or Network Share.
    - For Destination Name, provide a name for the destination object that will be used later in scheduled backup jobs to refer to the backup job destination location.
    - For Destination Path, provide the destination path, either by entering the path into the field or selecting Browse to use Windows Explorer to browse to the path.
    - If you select Network Share, then you must select which of two option you wish to use to provide credentials to the network share, they are:
        - Connect using the ShadowProtect Backup Service credentials; or
        - Connect using specific user credentials. If you use this option you must provide a qualified username and password that ShadowProtect will use to access the network share. As you type in the fields you will see the Qualified User Name field automatically be filled in.
    - If you want ShadowProtect to verify the destination object path and the credentials for accessing the location place a check in the box next to “Verify destination access upon clicking Finish.”

    Note: If you are saving to a NAS device, you may need to enter in the name of the NAS followed by the username and password. You must ensure you are using a fully qualified user name to access network shares.

    Select Finish to create the backup job destination. If you opted to verify the destination access, ShadowProtect will verify the destination and if successful, create the backup job destination. If the destination access verification is not successful the program will alert you that the destination could not be created as requested. You should then check the path and credentials used to make sure they are accurate and retry creating the destination.

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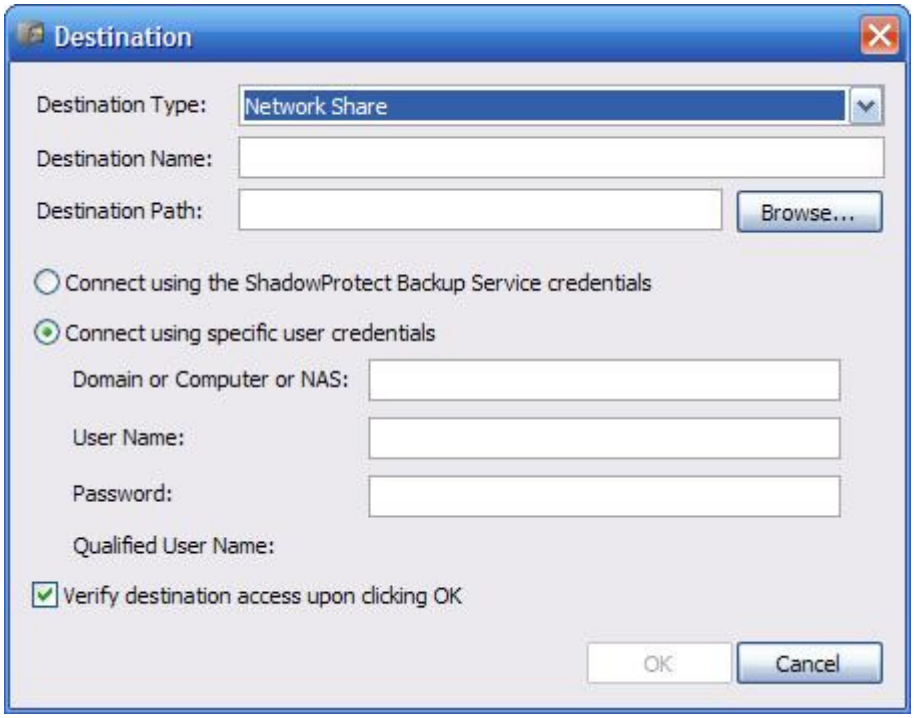

Figure 5: Destination Dialog Screen

5.7.1.2 Editing Destination

To edit a backup job destination, select the Destinations tab from the center panel of the main screen. Select the destination you wish to edit and click the Edit button. This will open the Destination dialog (see Figure 5 above). The current destination configuration information is displayed. You may edit all of the information associated with the backup job destination. However, you may not change the network type, such as converting a network share to a local directory or conversely a local directory to a network share.

Note: ShadowProtect requires that every computer have its own folder for storing backup image files and that multiple computers are not saving backup image files to the same folder.

Note: You cannot edit a Destination Type, e.g., you cannot change a Local Directory to a Network Share or conversely a Network Share to a Local Directory.

5.7.1.3 Deleting Destinations

To delete a backup job destination, select the Destinations tab from the center panel of the main screen. Select the backup job destination you wish to delete and click the Delete button.

Note: Any scheduled backup job using a deleted Destination will fail. The backup job should have its Destination modified by editing the backup job or if the backup job is temporarily or permanently obsolete, the backup job should be disabled or deleted.

5.7.2 Execute a Backup Job Immediately

You can execute a scheduled backup job manually in ShadowProtect. To do this, click on the Backup Jobs tab from the center panel of the main screen. Highlight the job you want to execute and click the Execute button. The backup job that runs is the next scheduled backup job. If you wish to specify a full, differential or incremental backup image to be taken, click the down arrow on the Execution button and select the backup image type you wish to be executed. You may also access these options by right

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clicking on the scheduled backup job and selecting the backup type you wish to execute from the context menu.

5.7.3 Editing a Backup Job

You can edit a scheduled backup job in ShadowProtect. To do this, click on the Backup Jobs tab from the center panel. Highlight the job you want to edit and click the Edit button or you may right click on the job you wish to edit and select edit from the presented menu

The Edit Job Schedule menu is presented. Make your desired changes to the job schedule and select ok to save the changes or select cancel to cancel the operation.

5.7.4 Disabling and Enabling a Backup Job

You can disable a scheduled backup job in ShadowProtect. To do this, click on the Backup Jobs tab from the center panel. Highlight the job you want to disable and right click. Select Disable from the context menu. When a backup job is disabled, it will not run until it is enabled.

To enable a disabled backup job, click on the Backup Jobs tab from the center panel. Highlight the disabled job you want to enable and right click. Select Enable from the context menu.

5.7.5 Deleting a Backup Job

You can delete a backup job by selecting the Backup Jobs tab from the center panel. Highlight the job you want to delete and click the Delete button or you may right click on the job you wish to delete and select delete from the context menu.

5.8 Manually Creating a Backup Image File (Backup Now)

The Backup Wizard walks you through each step for creating a backup of an entire Server, desktop or laptop or specific volumes. The wizard guides you through the process of selecting which volumes to back up and where to store the backup images.

Note: In order to run the Backup Now Wizard and create a backup image file of a volume, you must be a member of the Administrator group on the computer you are creating a backup image of.

Note: Backup Now jobs do not affect scheduled backup jobs.

5.8.1 Steps for Manually Creating a Backup Image File

1. To start the Backup Wizard click Backup Wizard from the center panel of the main screen or select Backup Now from the left panel of the user interface. This will start the Backup Wizard (see Figure 6). Click Next to continue.

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Backup
Welcome to the Backup Wizard!
This wizard will guide you through the creation of a backup job.
Press Next to continue
< Back
Next >
Cancel

Figure 6: Backup Wizard Welcome Screen

2. This will bring up the volumes to backup screen (see Figure 7). You can select which volumes you want to backup. Click Next to continue.

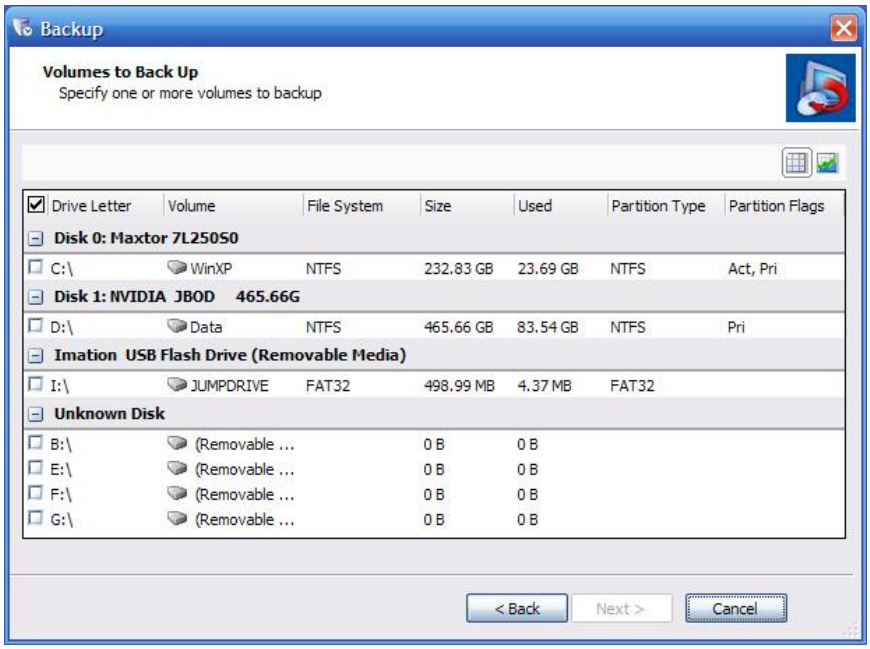
Backup
Volumes to Back Up
Specify one or more volumes to backup
Drive Letter | Volume | File System | Size | Used | Partition Type | Partition Flags
Disk 0: Maxtor 7L250S0
C:\ WinXP NTFS 232.83 GB 23.69 GB NTFS Act, Pri
Disk 1: NVIDIA JBOD 465.66G
D:\ Data NTFS 465.66 GB 83.54 GB NTFS Pri
Imation USB Flash Drive (Removable Media)
I:\ JUMPDRIVE FAT32 498.99 MB 4.37 MB FAT32
Unknown Disk
B:\ (Removable ... 0 B 0 B
E:\ (Removable ... 0 B 0 B
F:\ (Removable ... 0 B 0 B
G:\ (Removable ... 0 B 0 B
< Back
Next >
Cancel

Figure 7: Volumes to Back up

Now you can select where you want to store your backup image. You can type in the path to the location, use the drop down arrow and select a pre-defined destination, or you can click the Browse button and manually browse to the desired location. You can also right click on the file name and rename the backup file. Click Next.

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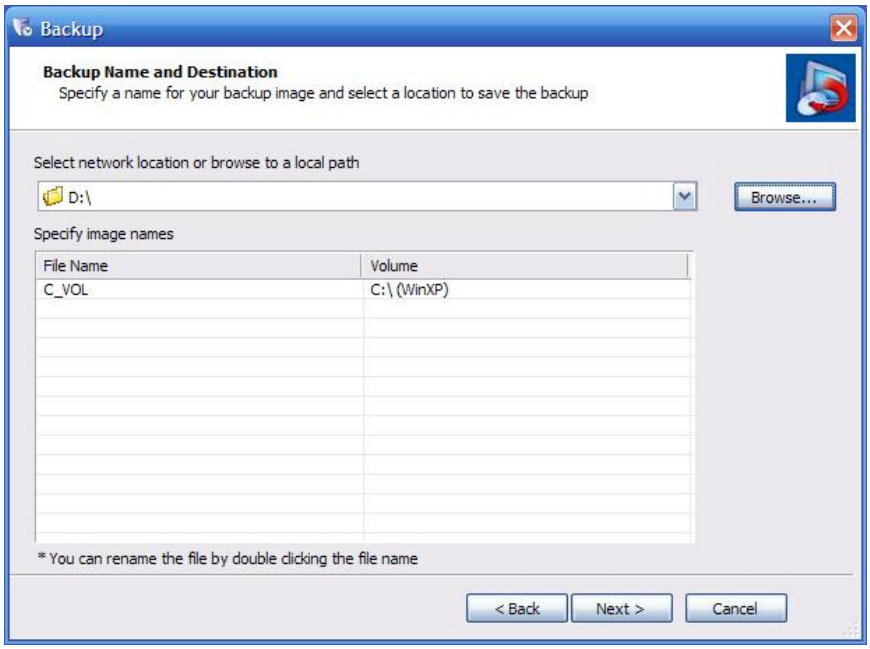
Backup
Backup Name and Destination
Specify a name for your backup image and select a location to save the backup
Select network location or browse to a local path
D:\
Browse...
Specify image names
File Name
Volume
C_VOL
C:\ (WinXP)
* You can rename the file by double clicking the file name
< Back
Next >
Cancel

Figure 8: Select Where to Store Your Backup

3. This will bring up the Backup Schedule dialog screen (See Figure 9). Now you can select the type of backup schedule you want to use. If you are performing a backup now, you can decide to take a Full or a Differential backup. If you select Differential, you will need to select a previous backup you can compare the current data on the disk to. Click Next.

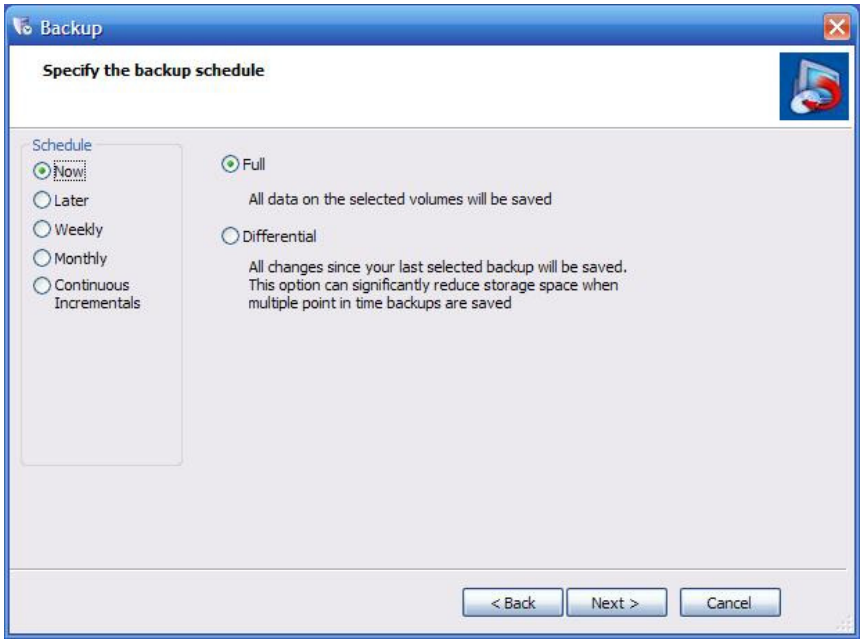

Figure 9: Backup Schedule

4. This will bring up the Backup Options dialog screen (see Figure 10). Select the compression level from the drop-down list. See *Section 5.5.3 Compression Level* for additional information.

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5. (optional) To use encryption, place a check next to Use Password. This option will encrypt the backup image file. See *Section 5.5.4 Password Encrypting Backup Image Files* for additional information.
    a. Select the encryption method you want to use for the backup image.
    b. Enter a password for the backup image file. You may use alpha and numerical characters. Confirm the password by typing it again.
6. (optional) Select whether you want the backup image file split into smaller files. If you select to split the backup image file, enter the maximum file size in megabytes for each file. See *Section 5.5.6 Splitting a Backup Image File into Smaller Files* for additional information.
7. (optional) Enter any backup comments you want for the backup image. By default the time and date stamp are added to the backup image. Click Next.

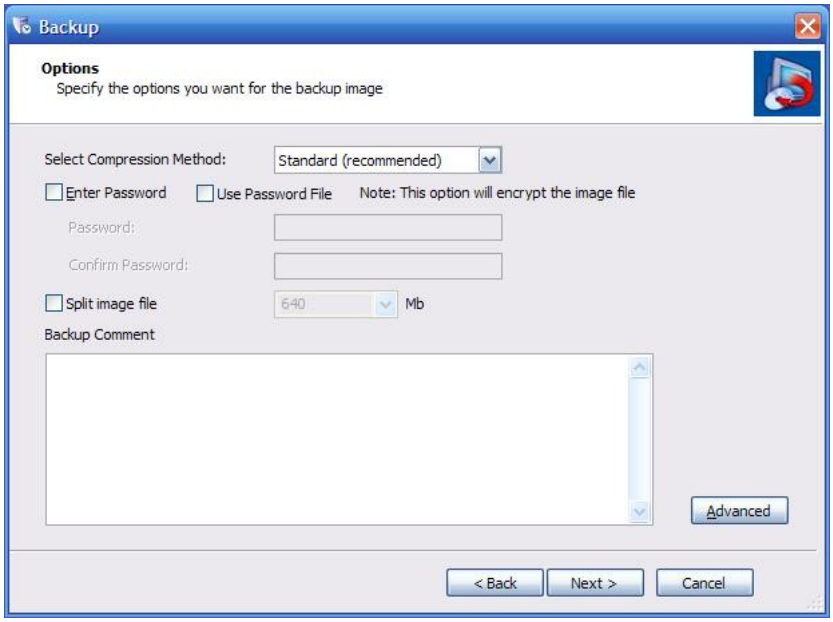

Figure 10: Backup Options

8. This brings up the Wizard Summary screen (see **Error! Reference source not found.**). Review the backup job summary and click Finish to create the selected backup job. If you wish to execute the backup job immediately, you can put a check in the Execute Now box.
You can monitor the progress of the backup job by selecting the Backup Jobs tab, selecting the job and then clicking the details button. Information on the backup job will be presented in a tab in the lower half of the Backup Jobs tab. You may also check the results of a backup job that was previously executed by selecting the Backup History tab from the center panel of the main screen and clicking on the executed job.

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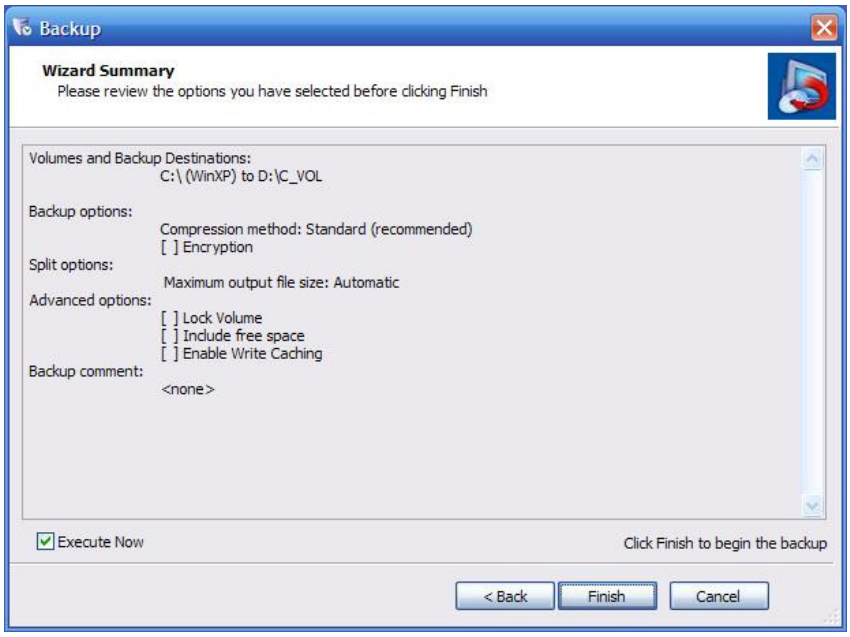

Figure 11: Backup Summary

5.9 Scheduling Backup Jobs

You can automatically schedule backup jobs using a daily or monthly schedule. You may also schedule a backup job to run only once, now, later or choose a schedule that includes Continuous Incrementals.

Note: Each volume can belong to no more than one scheduled backup job using incrementals. Sector tracking can only support incremental tracking for one scheduled backup job per volume. You may include a volume belonging to a backup job using incrementals if the other jobs are for full image jobs only. This restriction does not apply to Backup Now jobs that use differential image generation and do not disrupt the sector tracking.

Note: If ShadowProtect is busy running a job or the computer is turned off and unavailable, any scheduled backup jobs during this time will be skipped. ShadowProtect will continue to schedule backup image jobs when the computer is available or if the advanced option is selected, Auto execution of unexecuted tasks. If this option is selected, as soon as the computer is available, the backup will be executed. If this option is not selected, the next backup will take place on it's normal schedule.

5.9.1 Backup Image Schedule Options

Table 10 below describes the backup image options when creating a scheduled backup job.

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Table 10: Backup Image Schedule Options

Schedule Option	Description
Now / Full or Differential	A full or differential backup is taken now. An example of this schedule would be to take a full backup image right now.
Later / Full Only	Creates a schedule to take a full backup image at a specified date and time. This job will only run once. An example of this schedule would be to take a full backup image at a later date.
Weekly / Full with Incrementals	A full backup image is created on the specified day(s) of the week and at the specified time. Incremental images are created for specified day(s) and times. An example of this schedule would be to take a full backup image on Sunday and take incremental backups everyday of the week, every 15 minutes, starting at 6:00a.m. until 9:00p.m.
Continuous Incrementals / One Full with Incrementals	A full backup image is created only *once.* Incrementals are then taken on a daily basis at any given time. You can also choose to use the VSS framework for the backup or to use StorageCraft Volume Snapshot Manager An example of this schedule would be to take a full backup image once. Then take incremental backups everyday, every fifteen minutes from 6:00a.m. to 9:00p.m., using VSS to take the backup images.

5.9.2 Steps for Creating a Scheduled Backup Job

1. To create a scheduled backup, select Backup from the left panel of the main screen or click on the Backup Jobs tab in the center panel of the main screen and click on the Add button. This will start the Backup Wizard (see Figure 12). Click Next to continue.

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Backup
Welcome to the Backup Wizard!
This wizard will guide you through the creation of a backup job.
Press Next to continue
< Back
Next >
Cancel

Figure 12: Backup Wizard Welcome Screen

2. This will bring up the Volumes to Backup dialog screen (see Figure 13). Select one or more volumes to backup. Place a check in the box next to the volume(s) you wish to backup or click the check box at the top next to Drive Letter to select all volumes on that system. A separate backup file will be created for each volume when you select to backup multiple volumes. Click Next to continue.

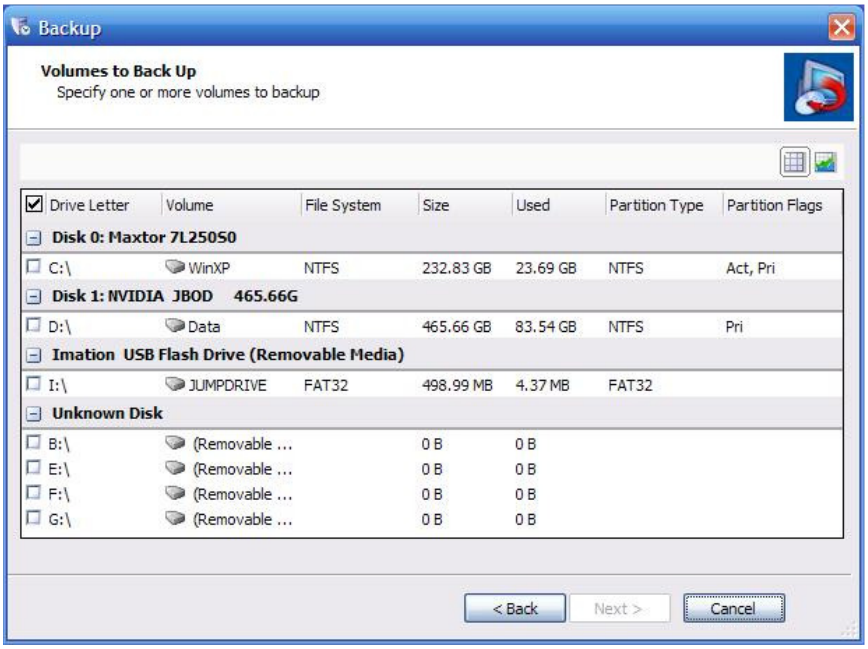
Backup
Volumes to Back Up
Specify one or more volumes to backup
Drive Letter
Volume
File System
Size
Used
Partition Type
Partition Flags
Disk 0: Maxtor 7L250S0
C:\ WinXP NTFS 232.83 GB 23.69 GB NTFS Act, Pri
Disk 1: NVIDIA JBOD 465.66G
D:\ Data NTFS 465.66 GB 83.54 GB NTFS Pri
Imation USB Flash Drive (Removable Media)
I:\ JUMPDRIVE FAT32 498.99 MB 4.37 MB FAT32
Unknown Disk
B:\ (Removable ... 0 B 0 B
E:\ (Removable ... 0 B 0 B
F:\ (Removable ... 0 B 0 B
G:\ (Removable ... 0 B 0 B
< Back
Next >
Cancel

Figure 13: Specify Volumes for Scheduled Backup Job

3. This brings up the Backup Name and Destination dialog screen (see Figure 14). Select a Destination Object location for the backup image file by selecting a previously created Destination Object from the drop down menu, or click Create to create a new Destination Object. See

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Section ***Error! Reference source not found. Error! Reference source not found.*** for additional information.

4. A default image name is created for the backup image file. You can change the default name by double clicking on the default image name and entering a new name. Click Next to continue.

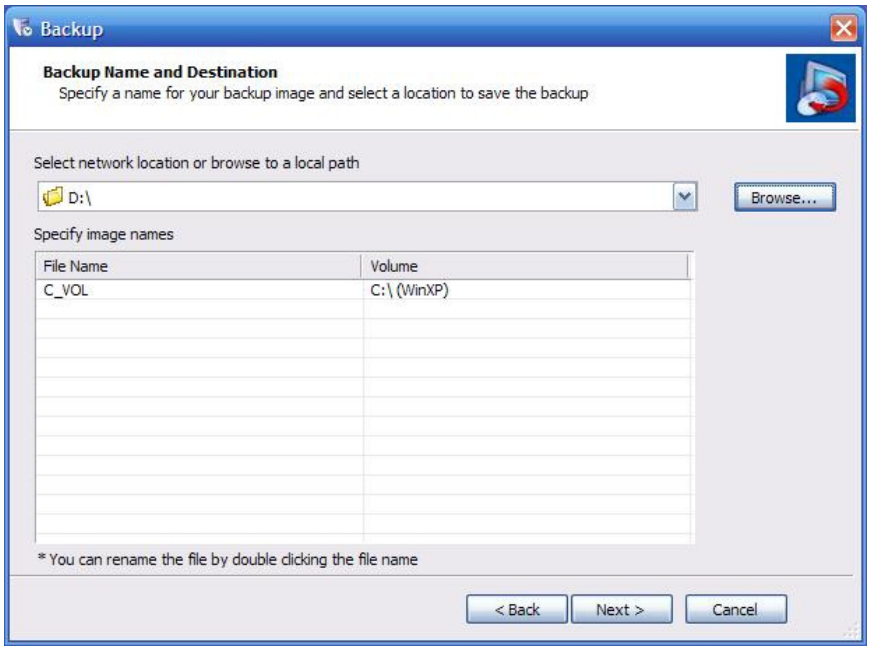
Backup
Backup Name and Destination
Specify a name for your backup image and select a location to save the backup
Select network location or browse to a local path
D:\
Browse...
Specify image names
File Name
Volume
C_VOL
C:\ (WinXP)
* You can rename the file by double clicking the file name
< Back
Next >
Cancel

Figure 14: Specify Backup Name and Destination for Scheduled Backup Job

5. This brings up the Specify the Backup Schedule dialog screen (see Figure 15). You may specify the schedule based on the following options: Now, Later, Weekly, Monthly and Continuous Incrementals. See *Section 5.9.1 Backup Image Schedule Options* for more information. You can select the schedule option you want to implement for the backup job by clicking the radio button next to the backup schedule.
    a. Now – select this option if you want to run the backup job now.
        i. Select the type of backup (Full, Differential).
        ii. Click Next to continue. (Proceed to Step 6.)

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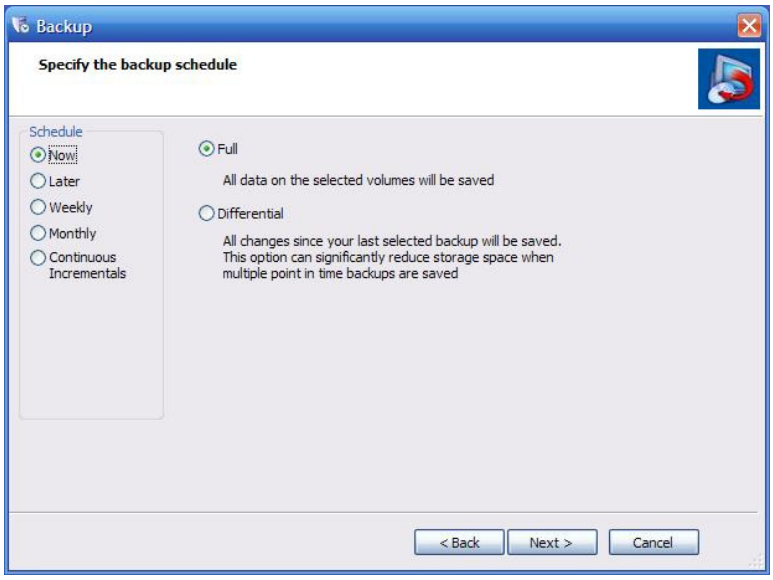

Figure 15: Backup Now Dialog Screen

b. Later – select this option to configure a backup to run later.
   i. Enter the date and time you want the backup to take place.
   ii. Click Next to continue. (Proceed to Step 6.)

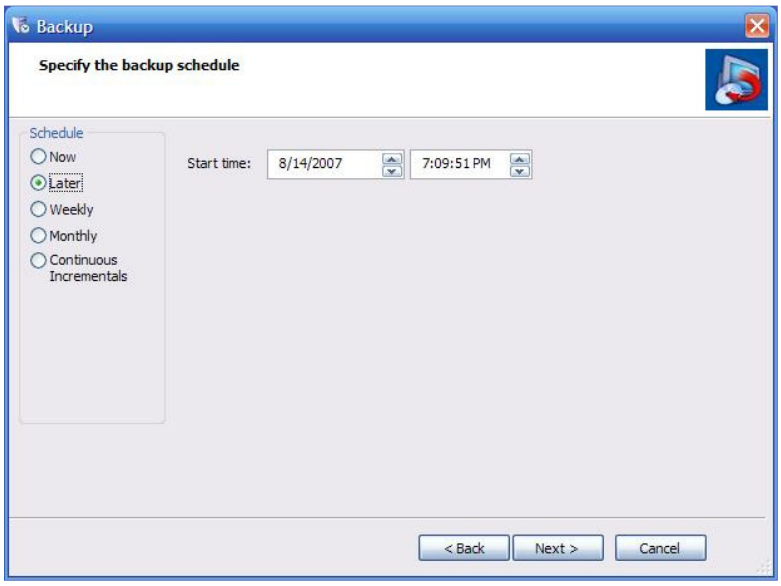

Figure 16: Backup Later Schedule Dialog Screen

c. Weekly – select this option to configure a schedule to backup on a weekly or daily basis.
   i. Select which days of the week to take a full backup.
   ii. Enter the time of the day to take the full backup image.
   iii. Enter the days you want to take incremental images by placing a check mark under the day of the week.
   iv. Enter the start time for taking incremental backup images.
   v. Enter the stop time for taking incremental backup images.
   vi. Enter in the minutes between backups.
   vii. Click Next to continue. (Proceed to Step 6.)

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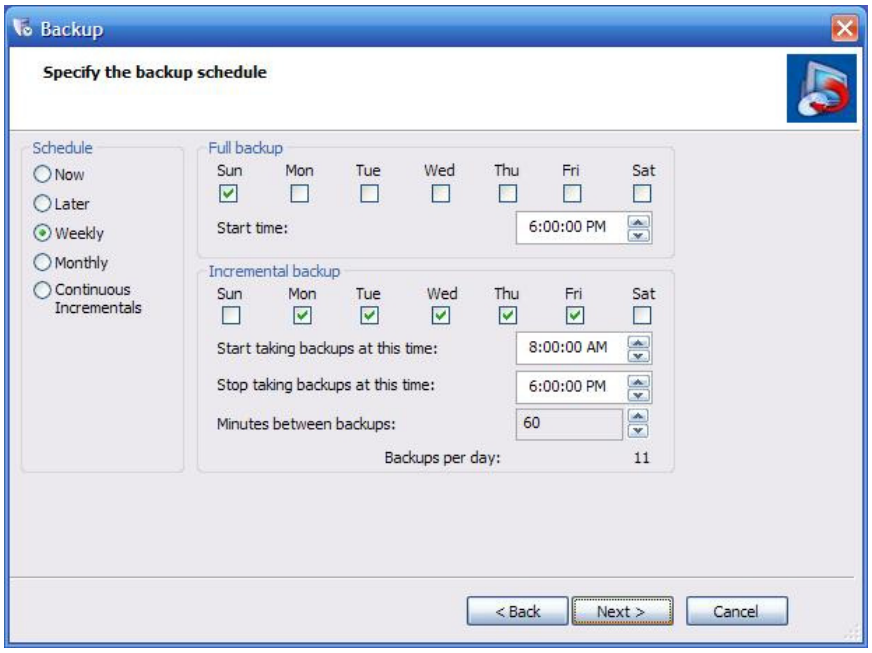

Figure 17: Weekly Backup Schedule Dialog Screen

d. Monthly – select this option if you want to set up a backup job to run on a monthly schedule. Click Next. (Proceed to Step 6)

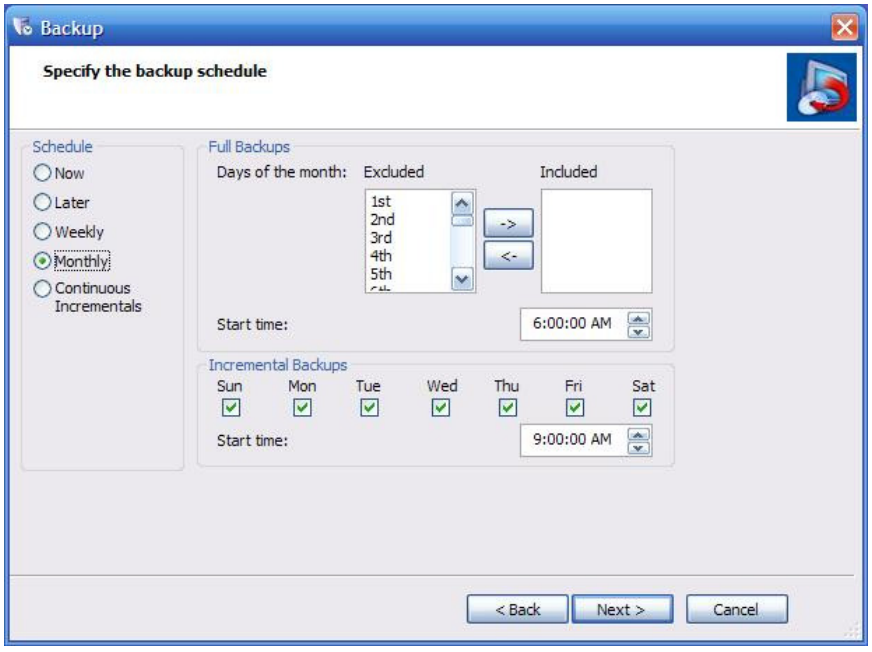

Figure 18: Monthly Backup Schedule Dialog Screen

e. Continuous Incrementals – select this option if you want to create only one full backup and only take incremental backups from that point forward. You will need to configure the ShadowProtect ImageManager. See CHAPTER 6: SHADOWPROTECT for information on configuring the ImageManager.

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i. Select the days of the week you want to take a VSS Incremental and the start time.
ii. Select additional incremental backups by selecting the day of the week.
iii. Enter in a start time for the backups.
iv. Enter in a stop time to stop taking backups.
v. Enter in the minutes between backups.
vi. Select to force all backups to use VSS.
vii. Click Next. (Proceed to Step 6)

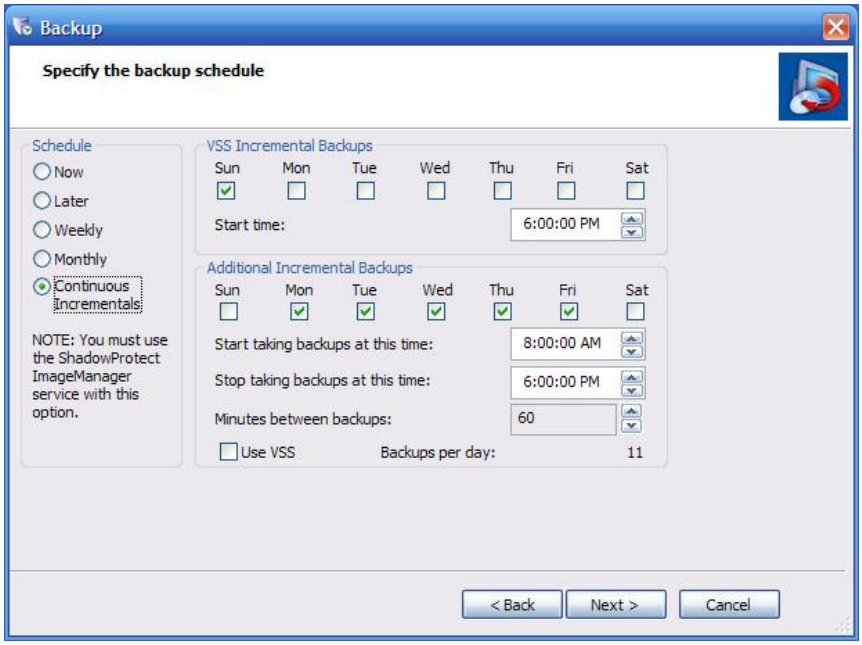

Figure 19: Continuous Incrementals Backup Schedule Dialog Screen

6. This will bring up the Options dialog screen (see Figure 21). Select the compression level from the drop-down list. See *Section 5.5.3 Compression Level* for additional information.
7. (Optional) To use encryption, place a check next to Use Password. This option will encrypt the backup image file. See *Section 5.5.4 Password Encrypting Backup Image Files* for additional information.
    - Select the encryption method you want to use for the backup image by clicking the Advanced tab and selecting the Encryption tab.
    - Enter a password for the backup image file. You may use alpha and numerical characters. Confirm the password by typing it again.
8. (Optional) Select whether you want the backup image file split into smaller files. If you select to split the backup image file, enter the maximum file size in megabytes for each file. See *Section 5.5.6 Splitting a Backup Image File into Smaller Files* for additional information.
9. (Optional) Enter any backup comments you want for the backup image. By default the time and date stamp are added to the backup image.
10. If you selected to enable the retention policy from the Advanced menu and the Retention tab, then select the number of backup image sets to retain.
11. If you selected to enable the retention policy, then select between the following two options:
    - **Delete only the incremental backup images (retain full backup images).** Select this option to delete only the incremental images but retain the full images. This is the default selection.

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- **Delete both the full and incremental backup images in the set.** Select this option to delete the full and incremental images for image sets that will be discarded according to the image retention policy.

Note: When the retention limit is reached, each successive backup image set is first created and saved prior to deleting the oldest backup image set in accordance with the retention policy.

Note: Be sure you have enough storage space to accommodate the number of backup image sets you define using the retention policy.

Note: If you run out of storage space before reaching the retention limit, the active backup job will fail to complete successfully.

For additional information on different backup job configurations using the retention policy, see *APPENDIX B: COMMON RETENTION POLICY CONFIGURATIONS.* After configuring the retention policy, click OK to continue.

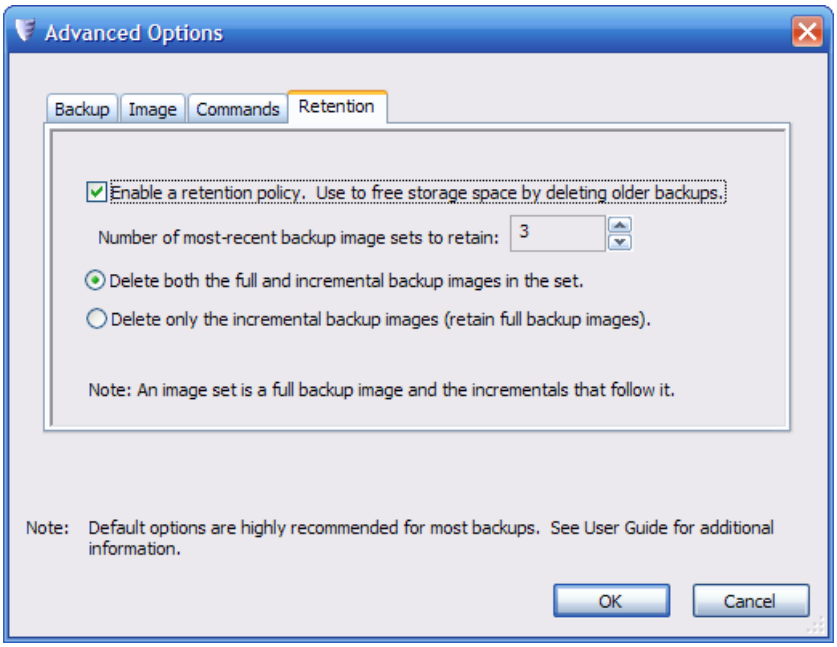
Advanced Options
Backup
Image
Commands
Retention
Enable a retention policy. Use to free storage space by deleting older backups.
Number of most-recent backup image sets to retain:
3
Delete both the full and incremental backup images in the set.
Delete only the incremental backup images (retain full backup images).
Note: An image set is a full backup image and the incrementals that follow it.
Note: Default options are highly recommended for most backups. See User Guide for additional information.
OK
Cancel

Figure 20: Scheduled Backup Job Retention Policy Dialog Screen

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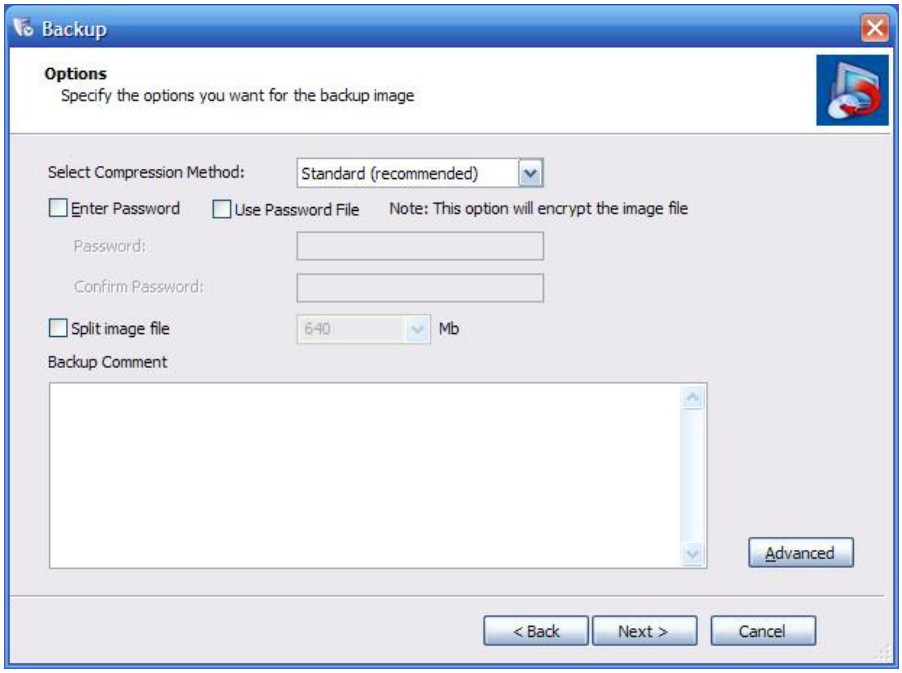

Figure 21: Options for Scheduled Backup Job

12. (Optional) Click the **Advanced** button for advanced options. This brings up the Advanced Options dialog screen (see Figure 22). Advanced options include the following tabs:
    - Backup options
    - Image options
    - Commands options
    - Encryption options
    - Retention options

    See *Section 5.6 Advanced Backup Image File Options* for additional information.

    Click Cancel to close the Advanced Options dialog screen and return to the Options dialog screen.
    Click Next to continue.

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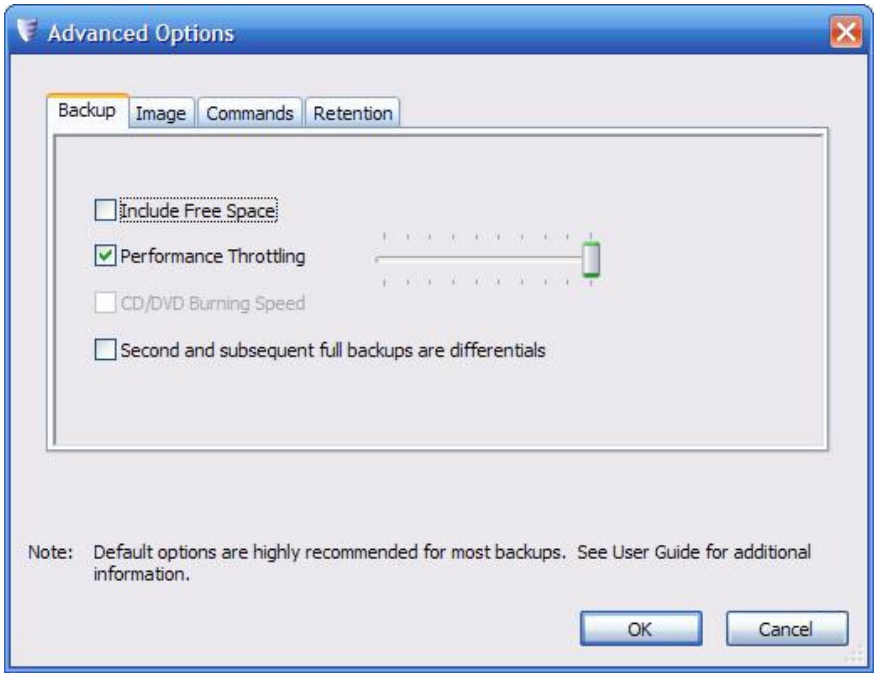

Figure 22: Advanced Options for Scheduled Backup Job

13. This brings up the Wizard Summary screen (see Figure 23). Review the backup job summary and click Finish to create the backup job. You may also put a check in the Execute Now box to automatically execute the backup schedule.

You may monitor the progress of the backup job by selecting the Backup Jobs tab, selecting the job and then clicking the details button. Information on the backup job will be presented in a tab in the lower half of the Backup Jobs tab. You may also check the results of a backup job that was previously executed by selecting the Backup History tab from the center panel of the main screen and clicking on the executed job.

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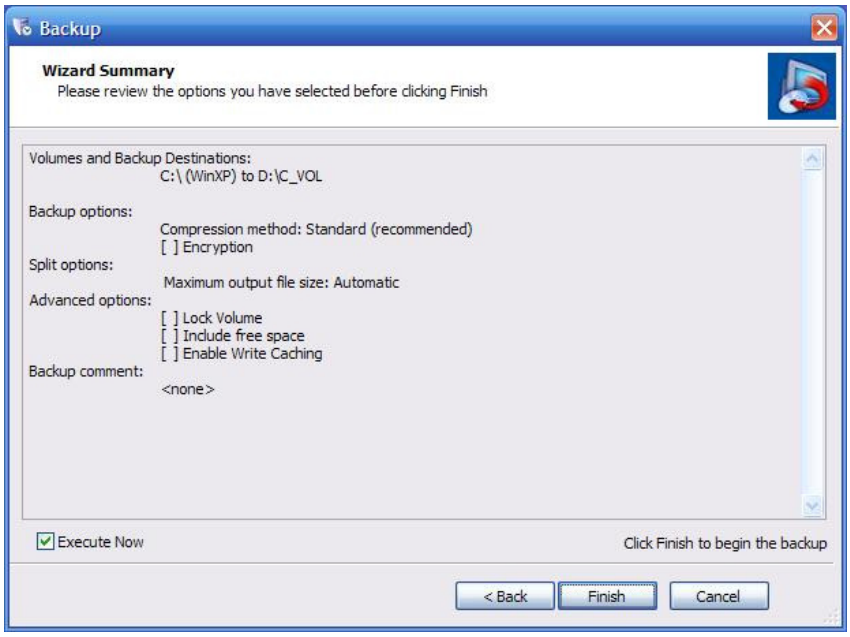

Figure 23: Wizard Summary for Scheduled Backup Job

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CHAPTER 6: SHADOWPROTECT IMAGEMANAGER

ShadowProtect ImageManager can be used to manage the storage space your backup images will consume. With the ImageManager you can set up policies to better manage the storage of your backup images. ImageManager will automatically collapse your backup images for you by creating a daily, weekly and monthly collapsed incremental. The ImageManager is to be used with the Continuous Incremental schedule option.

6.1.1 Starting the ImageManager

To start the ImageManager, click START→Programs→ShadowProtect→ImageManagerClient. This will start the ImageManager.

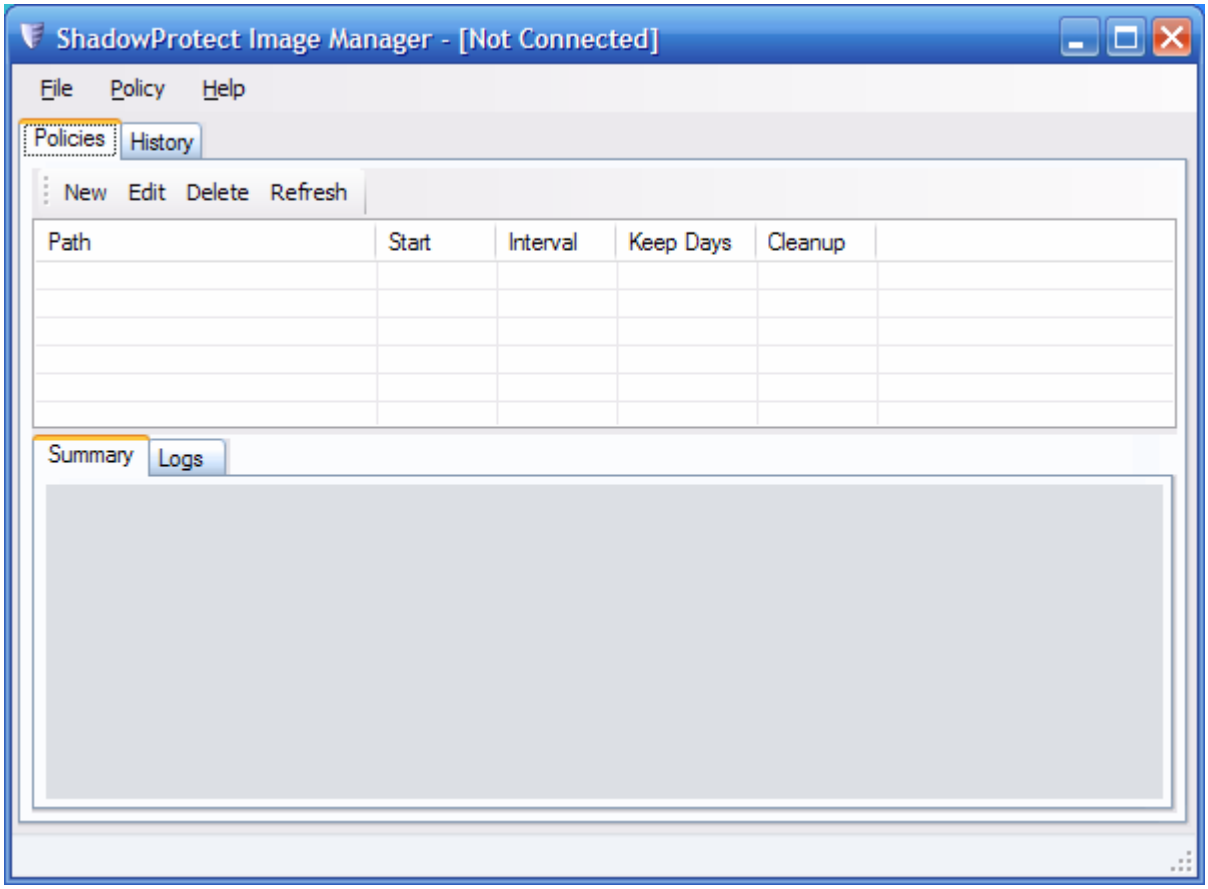

Figure 24: ShadowProtect ImageManager

You will need to connect so you can manage policies and set up a directory to monitor.

6.1.2 The ShadowProtect ImageManager User Interface

6.1.3 File

6.1.4 Connect to Server

This will bring up the Connect to Image Management Server options dialog.

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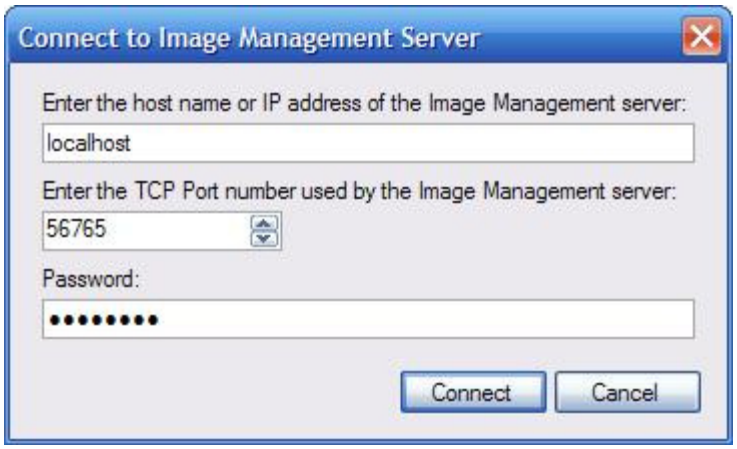
Connect to Image Management Server
Enter the host name or IP address of the Image Management server:
localhost
Enter the TCP Port number used by the Image Management server:
56765
Password:
Connect
Cancel

Figure 25: Connect to Image Management Server Configuration dialog

You can enter in the IP address of the Image Management server. Simply type in the IP address of the system containing the directory you want to monitor. By default you will see localhost in the box. This will connect you to the localhost.

You can also enter in the TCP port you want the Image Management Server to use. The default setting is 56765.

You may also want to enter in a password to connect to the Image Management Server.

6.1.5 Policy

6.1.6 Add Policy

To add a policy click Add Policy from the ShadowProtect ImageManager main screen.

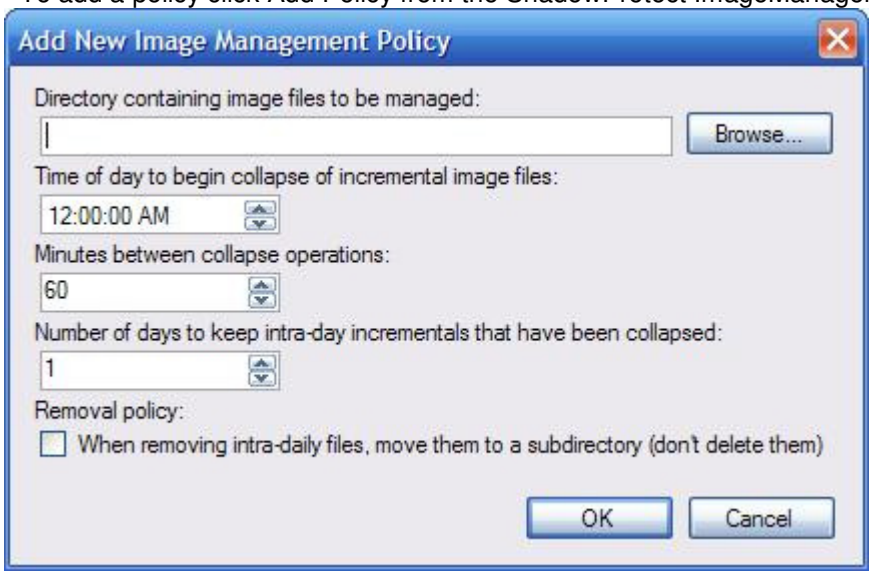
Add New Image Management Policy
Directory containing image files to be managed:
Browse...
Time of day to begin collapse of incremental image files:
12:00:00 AM
Minutes between collapse operations:
60
Number of days to keep intra-day incrementals that have been collapsed:
1
Removal policy:
When removing intra-daily files, move them to a subdirectory (don't delete them)
OK
Cancel

Figure 26: Add New Image Management Policy

Browse to the location of the directory you want to monitor. Or you can type in the path directly into the box. You can then select the time of day you want to begin the collapse of your incremental image files along with the minutes between each collapse operation.

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You can select the number of days you want to retain your intra-daily incremental after they have been collapsed. For example: You could have a schedule that creates an incremental backup every 15 minutes. Once those incremental images have been collapsed into a daily incremental, you can select the days you want to keep all of the 15 minute backup images before they are deleted. There is also a Removal policy allowing you to move the intra-daily incremental files to a subdirectory instead of deleting them. By default the ShadowProtect ImageManager creates a directory called Incrementals.

Note: You can only monitor ONE directory with the ShadowProtect ImageManager.

6.1.7 Edit Selected Policy

Click on Edit Selected Policy to edit the current policy

6.1.8 Delete Selected Policy

Click on Delete Selected Policy to delete the current policy

6.1.9 Refresh Policy List

Click on Refresh Policy List to refresh the list.

6.1.10 Help

Click Help to view the about information for ShadowProtect ImageManager.

About ImageManagerClient
ShadowProtect Image Manger
Version 1.0.0.3
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StorageCraft Technology Corporation
ShadowProtect Image Manager provides IT administrators with an easy and powerful way to automatically manage hundreds of thousands of backup image files. This client enables administrators to remotely manage servers that are running the ShadowProtect Image Manager Service.
OK

Figure 27: About ImageManager Client

6.1.11 Policies Tab

The Policies tab allows you manage your current policy you have configured. You can view information about the start time of the collapse procedure, the interval for the collapse, the days to keep the intra-daily incrementals and the cleanup policy.

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6.1.12 Summary Tab

On the Summary tab you can graphically view how much disk space your backup images are consuming.

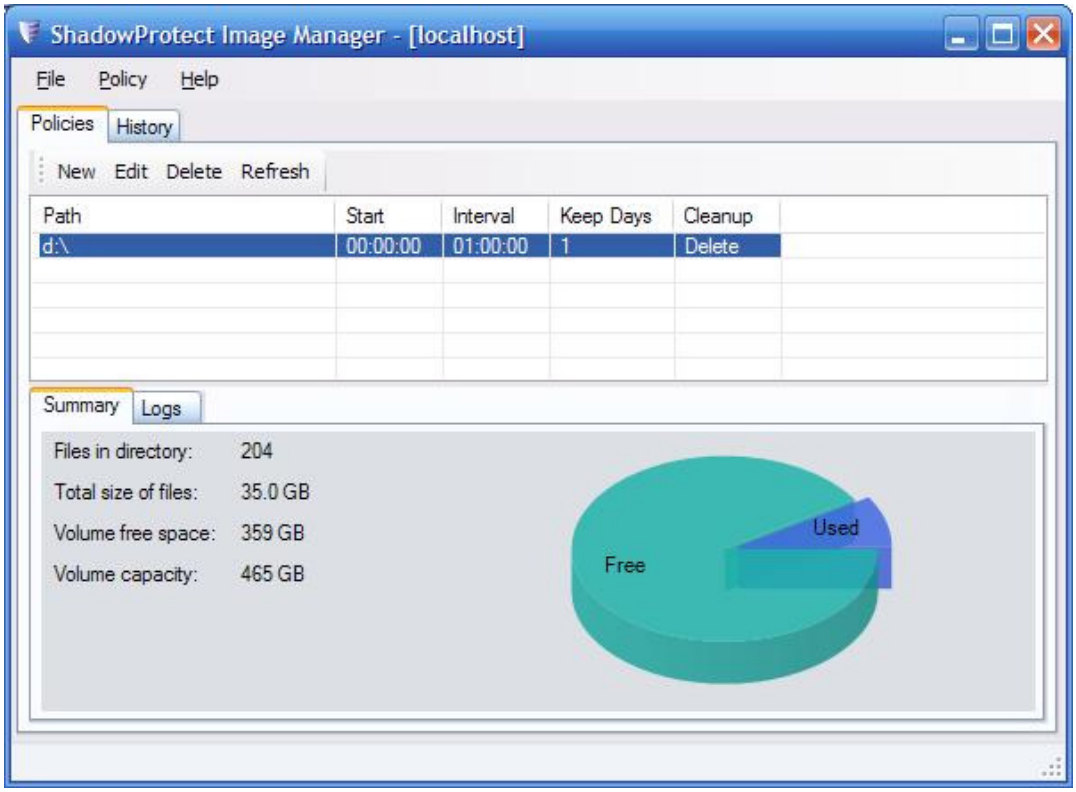

Figure 28: ShadowProtect ImageManager Status

The Summary tab provides information about the number of files in the directory, the total size of the files in GB, the volume free space and the volumes total capacity.

6.1.13 Logs Tab

The logs tab allows you to view a log from a specific date. Select a date and click the Retrieve button to view the log for that specific day.

6.1.14 History Tab

The history tab allows you to view the history of the collapse procedure and establish if there were any errors during the process.

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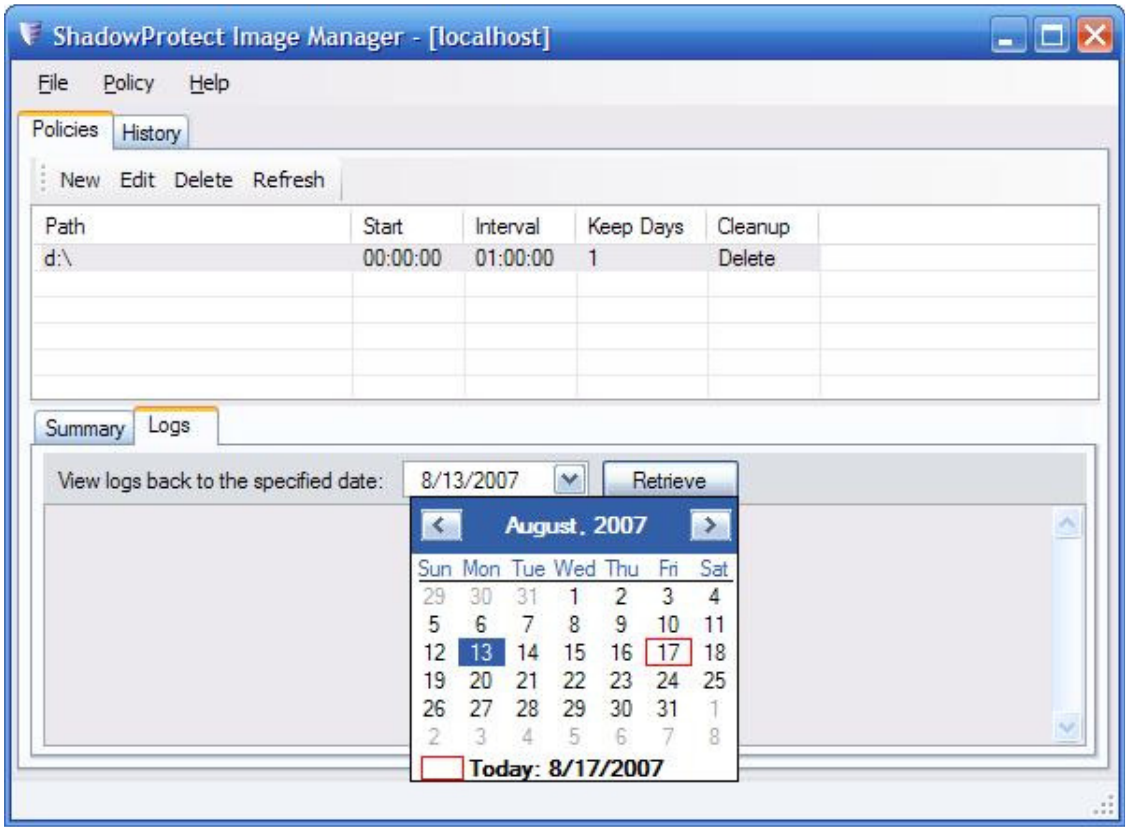

Figure 29: ShadowProtect ImageManager calendar view of logs

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CHAPTER 7: RESTORING FILES AND FOLDERS

You can restore individual files and folders using two methods. You can restore files and folders by using the Explore Backup Wizard while running in Windows, or you can restore files and folders from the StorageCraft Recovery Environment.

The Explore Backup wizard allows you to restore files and folders from an existing backup image. This wizard can be run from Windows or from the StorageCraft Recovery Environment. If the operating system is unable to boot, you must boot to the recovery environment to mount and restore files and folders. Table 11 below shows the restore method options and when a particular option should be used based on the state of the computer.

Note: To mount and restore data from an incremental backup image, you must have all previous incremental backup image files and the initial full backup image. If any backup images are missing from the set, mounting and restoring will be impossible.

Note: ShadowProtect will automatically associate the files required to browse and restore a specific point-in-time backup image. You are only required to select the point-in-time you want to explore.

Table 11: Methods for Restoring Files and Folders

Issue	Restore Method Option
If you can boot into the Windows® operating system and you have lost data or had undesirable changes to applications or hardware files on a volume. (excluding the operating system files).	Restore selected files and folders by mounting a backup image and recover the files from within Windows®. See *CHAPTER 1: ABOUT THE USER GUIDE* for additional information on mounting backup images and recovering files and folders.
You cannot boot into the Windows® operating system, and you have lost data or had undesirable changes to applications or hardware files on a volume, or you have lost operating system files.	Restore selected files and folders by booting the StorageCraft Recovery Environment and using the Explore Backup Image Wizard. See *CHAPTER 11: STORAGECRAFT RECOVERY ENVIRONMENT* for additional information on booting the StorageCraft Recovery Environment CD. See *CHAPTER 1:* ABOUT THE USER GUIDE for additional information on mounting backup images and recovering files and folders.

7.1 Mounting Backup Image Options

The two major options available when mounting a backup image file are:

1. Whether to mount the image as a drive letter or alternatively at a mount point location, and;
2. Whether to mount the image as read-only or as a writeable image.

The sections that follow address these options.

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7.1.1 Mounting a Backup Image as a Drive Letter

The ShadowProtect mount utility can mount a backup image file as a drive letter on your computer. When a backup image is mounted as a drive letter, the backup image will appear and behave as a drive letter on the computer with all the properties of the original volume.

7.1.2 Mounting a Backup Image as a Mount Point

The ShadowProtect mount utility can mount a backup image file as a mount point, which is a directory on an NTFS file system. Mount points overcome the limitation on the number of available drive letters and allow more logical organization of files and folders.

7.1.3 Mounting a Backup Image as Read-Only

ShadowProtect can mount a backup image file as read-only, which is the default setting. By mounting a backup image as read-only you can be assured that the backup image can not be changed while providing access to the image file to end users for file or folder recovery. Mount a backup image as read-only when:

- You want to recover files from an existing backup
- You want to view the contents of a backup
- You want to run other applications on an existing backup image such as a storage resource manager or data mining application.

Note: You cannot mount a backup image as read-only on Windows 2000 Server. The read-only option is only available on Windows Server 2003.

7.1.4 Mounting a Backup Image as Writeable

ShadowProtect can mount backup image files as writeable. By mounting a backup image as writeable, you have the ability to remove files from the backup image, such as viruses or other malware. You can also add files to the backup image file. Mount a backup Image as Writeable when:

- You want to update the security on the image file;
- You want to update an existing image file, such as removing a virus.

7.2 Mounting Backup Images Using the Context Menu

When exploring files using Windows Explorer, the Mount and Quick Mount options are available when right clicking on any ShadowProtect backup image file. For a previously mounted image file, you can right click and choose Dismount or Quick Dismount, see *Section 9.1 Dismounting Backup Images Using the Context Menu*.

7.2.1 Quick Mount

When you right click on a ShadowProtect backup image and select Quick Mount, the backup image will be mounted as read-only using the next available drive letter.

You can select multiple image files to quick mount, each image file will be assigned the next available drive letter.

7.2.2 Mount

When you right click on a ShadowProtect backup image and select Mount, the Browse or Restore Files Wizard will initiate. Using the Wizard to mount the backup image, you will be provided with the options of mounting as a mount point or drive letter as well as whether to mount the images as read-only or as read-write. See *Section 7.3 Steps for Restoring Files and Folders* for details and options available when mounting a backup image.

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You can simultaneously mount multiple backup image files, however, you must go through the Mount Wizard for each backup image you wish to mount, or alternatively, you can select to quick mount multiple backup images at once.

7.3 Steps for Restoring Files and Folders

1. To explore a backup image, select Explore Backup under Tasks in the left panel of the main screen or select Explore Backup from the center panel of the main screen. The third method to start the wizard is to select **Tasks** > **Explore Backup** from the Menu Bar. This will start the Explore Backup Wizard (see Figure 30). Click Next to Continue.

Explore Backup
Welcome to the Explore Backup Wizard!
This wizard will help you to explore the file and directory contents of an existing backup image file by temporarily mounting the backup image file to a drive letter or empty directory. You can then use File Explorer to restore selected files from the mounted backup image.
Press Next to continue
< Back
Next >
Cancel

Figure 30: Explore Backup Wizard Welcome Screen

2. This will bring up the Backup Image File Name dialog screen (see Figure 31). Select the image file you want to browse. You can either provide a path name to the file or click the Browse button to locate a file.

   Once you have selected a backup image file to browse, the properties for that backup image will be displayed. You can view information about the image file, originating partition, disk information and originating machine information. If you have selected a backup image file to which you have already saved changes, you will see a list of the dependencies of that image file, along with further information about the image and the originating machine from which the backup came. You can also view the original disk layout from the image file you selected.

   Note: If you select a backup image to which you have saved changes already, you can view the dependencies of that image file.

   Click Next to continue.

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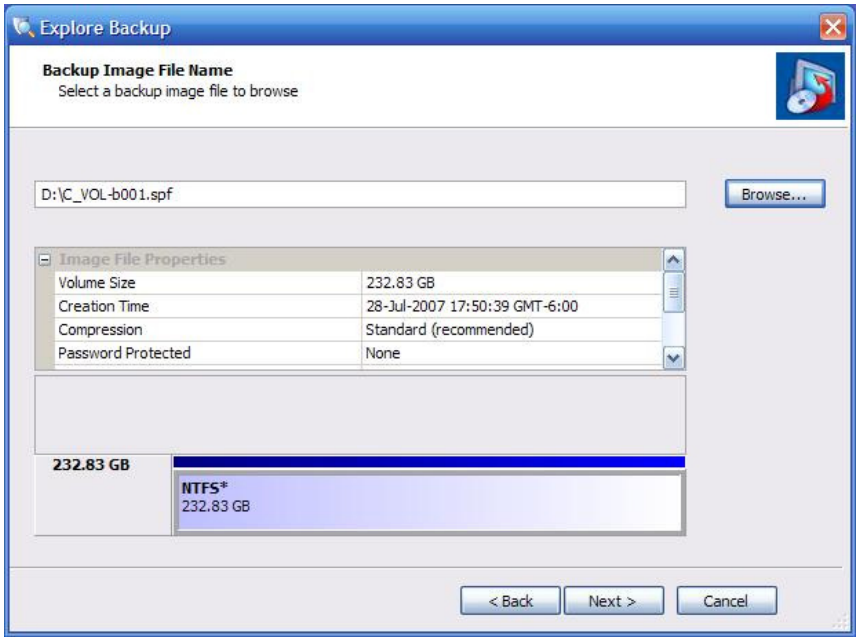

Figure 31: Select Backup Image File to Browse

3. This brings up the Backup Image Dependencies dialog screen (see Figure 32). This dialog presents all the points-in-time in the backup image set you selected. You can verify your selection or select another point-in-time from the image set. You can view information about the image file, originating partition, disk information and originating machine information. After selecting the point-in-time, click the Next button to continue.

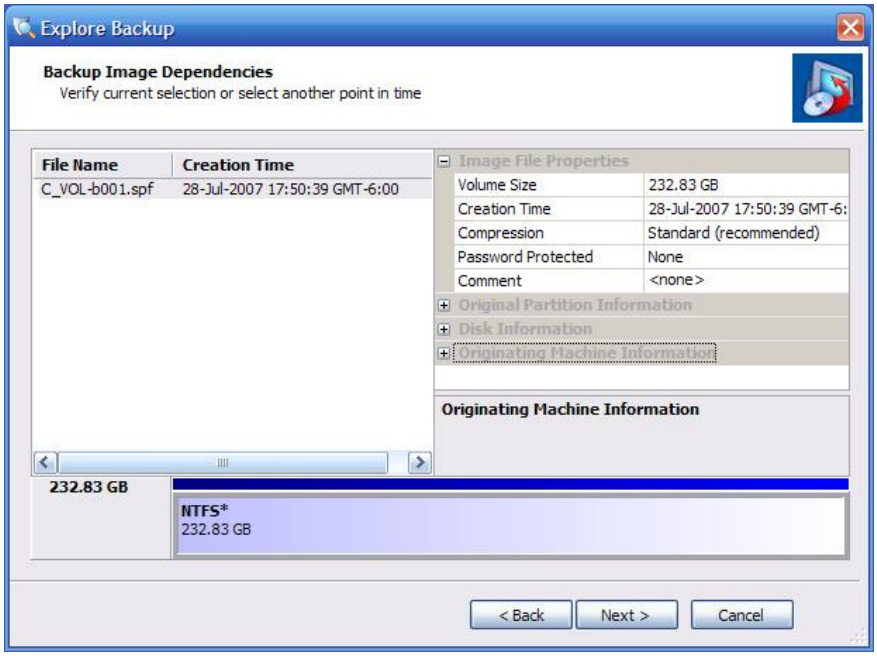

Figure 32: Backup Image Dependencies

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4. This will bring up the Specify Options for Exploring an Existing Backup Image dialog screen (see Figure 33). Select the radio button corresponding to the method you wish to use to mount the image

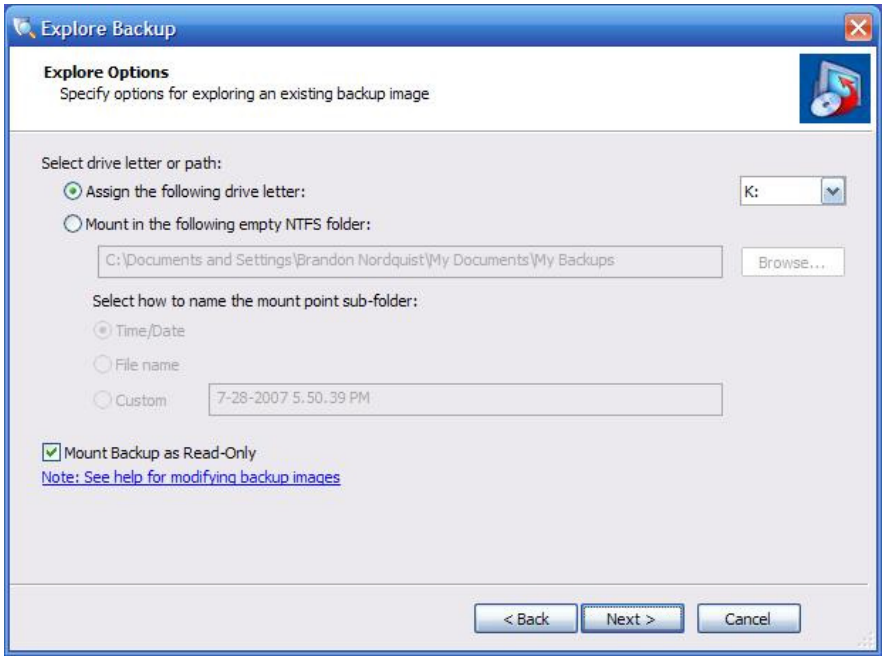

Figure 33: Options for Exploring a Backup Image

You can mount and explore the backup image file by either mounting the image using a drive letter (continue to Step 4a of this Section of the User Guide), or by creating a mount point for the image (continue to Step 4b of this Section of the User Guide).

a. Mounting image with a drive letter. See *Section 7.1.1 Mounting a Backup Image as a Drive Letter* for additional information.

   To mount a backup image and assign a drive letter, Select Assign the following drive letter and use the drop down menu to select which drive letter to assign to the backup image. You can decide if you want the image file to be read-only or writable by clicking the check box next to Mount Backup as Read-Only.

   You can mount a drive by assigning it a drive letter that is visible from Windows Explorer. After mounting a backup image as a drive letter, you can perform a variety of tasks, such as running ScanDisk (or CHKDSK), performing a virus check, defragmenting the drive, copying folders or files to an alternate location or simply viewing disk information about the drive such as used space and free space.

   Note: If the volume is marked as a writable volume, you can even remove viruses and other malware from the image file and save the changes to a subsequent incremental file.

   When a drive is mounted, you can set it up as a shared drive. Users on a network can connect to the shared drive and restore files and folders from within the backup image if you want end users to recover their own files. You also can mount one or more backup images at a time. The drives will remain mounted until you dismount them or restart the

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machine. If an NTFS volume uses EFS (Encrypted File System), the security remains intact on the volume when it is mounted.

To mount the backup image as a writeable volume, simply uncheck the box beside Mount Backup as Read-Only. (See the *Section 7.1.3 Mounting a Backup Image as Read-Only and Section 7.1.4 Mounting a Backup Image as Writeable* for further information).

Click Next to continue (go to Step 5)

b. Mounting image as a mount point. See *Section 7.1.2 Mounting a Backup Image as a Mount Point* for addition information.

   Select Mount in the following empty NTFS Folder.

   Mount points are helpful if you are limited in the number of drive letters you can use. ShadowProtect provides you the ability to mount thousands of mount points simultaneously.

   Note: Mount points can only be created on NTFS file systems.

   The default location for the mount points is in the MyBackups folder. You can enter a new path or click the Browse button to browse to a location.

   Select how you want to name the mount point sub-folder by selecting one of the options Time/Date, File Name, or Custom.

   Time/Date – this option will list the date and time the backup image was created. (Example: 7-12-2005 10.19.24 AM).

   File Name – this option will list the file name for the backup image. (Example: E_VOL b001).

   Custom – this option allows you to customize how you want to name the mount point sub-folders. (Example: Servername backup).

c. Select if you want the image to be mounted as read-only or as a writeable volume. (See the *Section 7.1.3 Mounting a Backup Image as Read-Only and Section 7.1.4 Mounting a Backup Image as Writeable* further information).

   Select Next to continue

5. This brings up the Wizard Summary (see Figure 34). Review the summary and click Finish to mount the backup image. After the backup image has been mounted, ShadowProtect will automatically bring up Windows Explorer showing the mounted volume.

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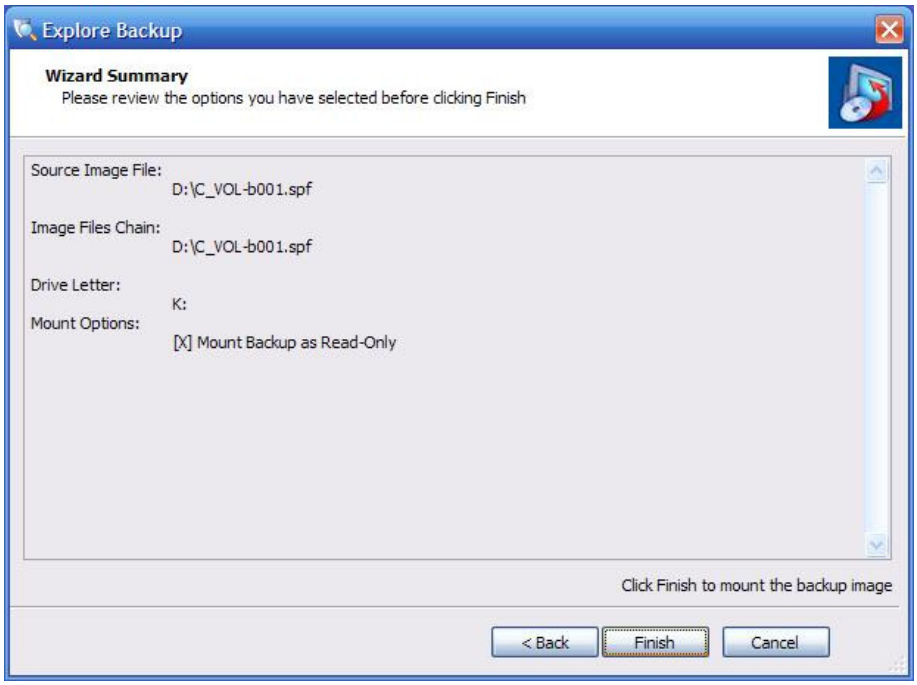

Figure 34: Wizard Summary for Exploring a Backup Image

6. With the backup image mounted, you may browse the contents of the volume as you would a regular volume, selecting files and folders you wish to copy and restore to a previous point-in-time.

7.4 Mounting a Backup Image as a Shared Writeable Drive

You can mount a backup image as a shared writeable drive or mount point using ShadowProtect. This means that:

- Mounted backup images will appear as their own drive letter or mount point.
- Using Windows Explorer or any other file manager, you will see the image contents as if they were located on a physical volume.
- You will be able to copy files and folders from the mounted backup image (a "virtual volume") to a real volume.
- The virtual volume will have the same Windows security and file properties as the original physical volume.
- Because ShadowProtect supports writeable images, you will be able to make changes to the virtual volume and those changes will be saved. At dismount, the changes to the mounted backup image can be saved as an incremental backup image file.

To mount a backup image as a shared writeable drive, follow the steps provided in *Section 7.3 Steps for Restoring Files and Folders.* If you wish to mount the image as writeable, be sure to select writeable in Step 4c.

After the backup image is mounted you may share the drive (or folder location if you mounted using a mount point location) as you would an ordinary physical drive.

Note: ShadowProtect does not allow the user to modify the original image file to prevent a good backup image from becoming corrupt.

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Note: If you mounted the backup image as writeable, you will be given the opportunity to save the changes to an incremental backup image file when you dismount the backup image. See *CHAPTER 9: DISMOUNTING BACKUP IMAGE FILES* for additional information.

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CHAPTER 8: RESTORING BACKUP IMAGE FILES

There are two methods you can use to restore volumes. The first method is to boot to the StorageCraft Recovery Environment and perform the restore. This option must be used when restoring the system volume where the operating system resides. The second method is to restore a volume, other than the system volume, while running inside of Windows using the Restore Volume Wizard. This method does not require the machine to be rebooted.

Note: In order to restore a system or a single volume, you must first create a backup image of the system or volume.

8.1 Steps for Restoring a Volume

You can start the Restore Wizard by clicking the Restore button in the left panel of the main screen or clicking on the Restore Wizard from the center panel of the main screen. This can be done while ShadowProtect is running in Windows or from the StorageCraft Recovery Environment CD.

1. To start the Restore Wizard, select Restore under Tasks in the left panel of the user interface or select Restore Wizard from the center panel of the main screen. This will start the Restore Wizard (see Figure 35). Click Next to Continue.

Restore
Welcome to the Restore Wizard!
This wizard will help you to restore entire data volumes from existing backup image files. To restore the system volume you must restore by booting the ShadowProtect Recovery Environment CD. To restore individual files, run the Explore Backup wizard.
Press Next to continue
< Back
Next >
Cancel

Figure 35: Restore Wizard Welcome Screen

2. This will bring up the Backup Image to Restore dialog screen (see Figure 36). You will need to locate the image file you wish to restore from a destination location. These destination locations can be a local directory or network share.
   - If the image file you wish to restore is located in a previously defined destination location, then select the destination and locate the backup image set from the list. The next dialog screen will let you select the specific point-in-time associated with the backup image set.
   - If the image file you wish to restore is not located in a previously defined destination location, you will need to browse to the location of the image file you want to restore.

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Note: To restore a backup image that is stored on a network share, you must have the proper credentials to access the file.

Click Next to continue.

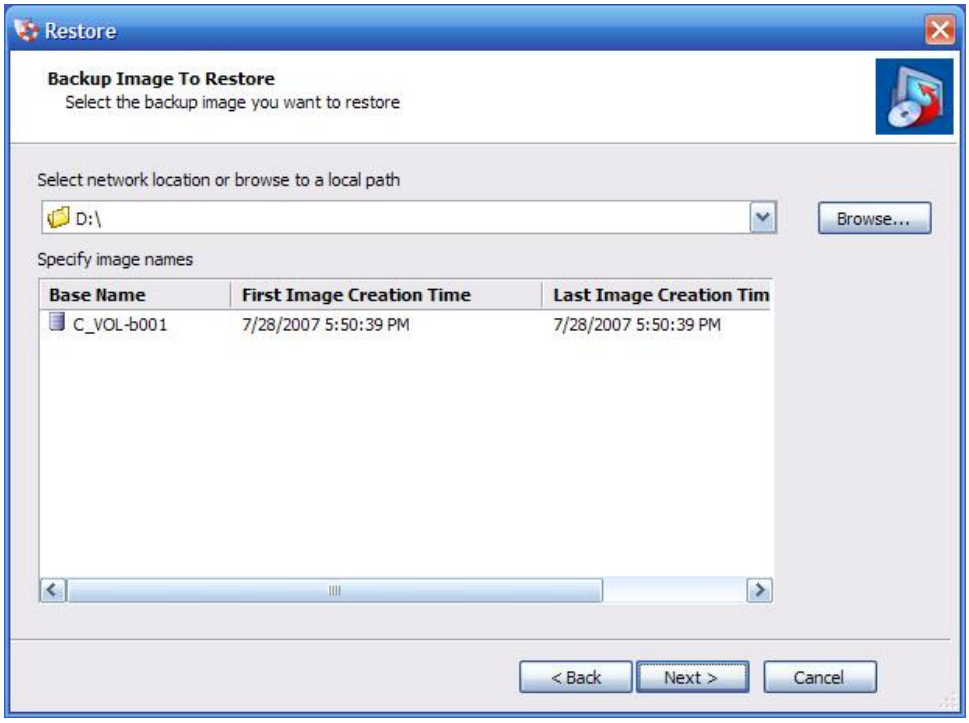

Figure 36: Select Image to Restore

3. This will bring up the Backup Image Dependencies dialog screen (see Figure 37). Here you will be provided with all the incremental backup image files associated with the full backup image file you selected. Select a backup image file to view its properties in the right side of the dialog. Image file properties include:
   - Image File Properties – volume size, creation time, compression, password protection, comment.
   - Original Partition Information – style, number, type, bootable option, starting offset and length.
   - Disk Information – disk geometry, disk size and number of the first track sectors. You can also view the disk layout graphically at the bottom of the screen. This represents what the disk looked like at the time of backup.
   - Originating machine - the operating system version, the machine name, MAC address and the engine version of ShadowProtect used to create the image file.

   By viewing the properties, particularly the information in the image file properties, you will be able to best select the backup image file you wish to restore. You can change your selection and review the new selection's image file properties by highlighting the image file in the left side of the dialog screen.

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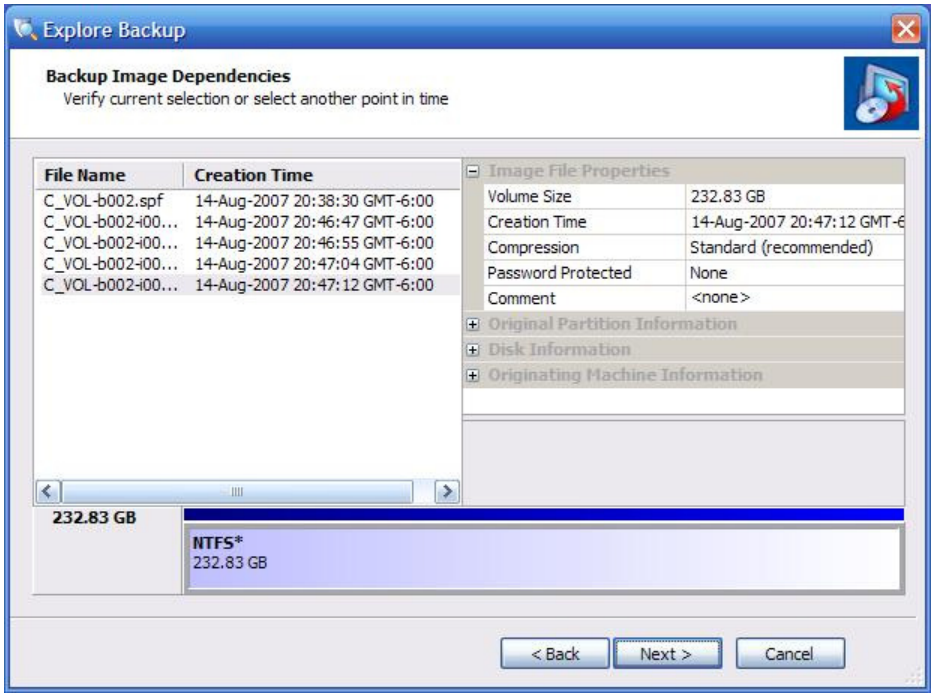

Figure 37: Backup Image Dependencies

Click Next to continue.

4. This will bring up the Restore Destination dialog screen (see Figure 38). Select the location where you want to restore the backup image. You may also right click on a volume and you will have the following options:
   - **Delete Volume** – This will delete a volume. The deleted volume will become unassigned space on the disk that can be repartition.
   - **Set Active** – This will set the volume active. Only one partition may be designated as active. By setting a volume active, the computer will boot to the volume.
   - **Create an exact primary partition** – Allows you to define and create a primary partition on the disk. You cannot create more than four (4) primary partitions on a disk.
   - **Create extended partition** – Allows you to extend a partition and then subdivide this partition into one or more logical partitions.

   Click Next to continue.

Note: Restoring a backup image to a volume overwrites all data currently on the volume.

Note: You must have enough space to restore the backup image. For example, you cannot restore a 4GB backup file with only 1GB of free space.

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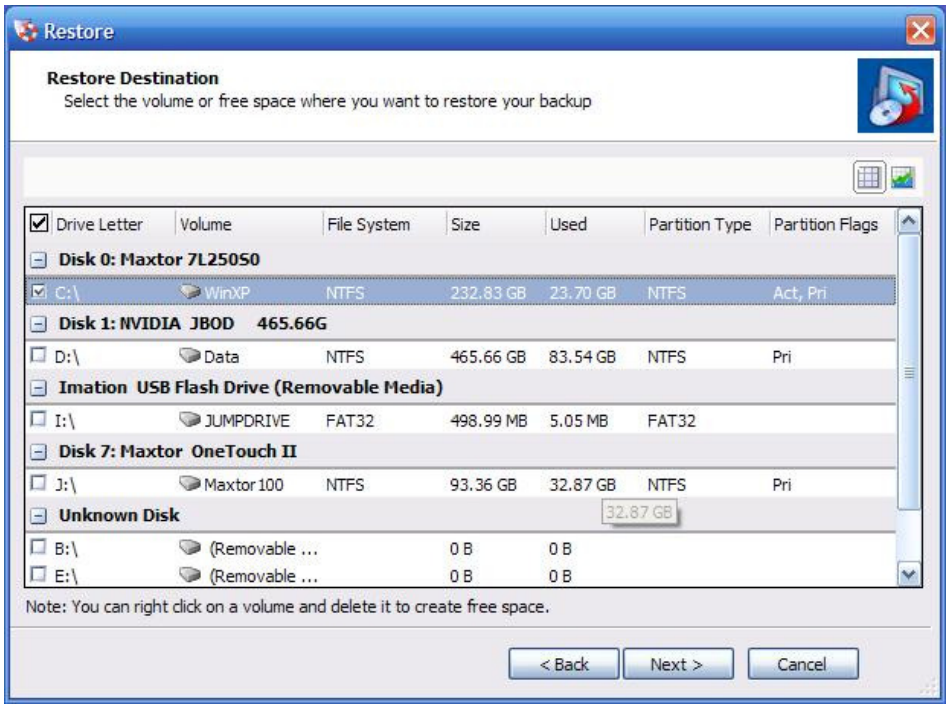
Restore
Restore Destination
Select the volume or free space where you want to restore your backup
Drive Letter
Volume
File System
Size
Used
Partition Type
Partition Flags
Disk 0: Maxtor 7L250S0
C:\ WinXP NTFS 232.83 GB 23.70 GB NTFS Act, Pri
Disk 1: NVIDIA JBOD 465.66G
D:\ Data NTFS 465.66 GB 83.54 GB NTFS Pri
Imation USB Flash Drive (Removable Media)
I:\ JUMPDRIVE FAT32 498.99 MB 5.05 MB FAT32
Disk 7: Maxtor OneTouch II
J:\ Maxtor 100 NTFS 93.36 GB 32.87 GB NTFS Pri
Unknown Disk
32.87 GB
B:\ (Removable ... 0 B 0 B
E:\ (Removable ... 0 B 0 B
Note: You can right click on a volume and delete it to create free space.
< Back
Next >
Cancel

Figure 38: Restore Destination

5. This will bring up the Specify the Restoration Options dialog screen (see Figure 39). All of these options are important when restoring the system volume on a computer.
   - Set Partition Active - This will make the restored drive the active partition (the drive the machine boots from).
   - Restore MBR - Restore the master boot record. The master boot record is contained in the first sector of the first physical hard drive. The MBR consists of a master boot program and a partition table that describes the disk partitions. The master boot program looks at the partition table to see which primary partition is active. It then starts the boot program from the boot sector of the active partition. You can restore the MBR from the image file that was saved with the backup image or you can restore an original Windows MBR.
   - Restore disk signature - Restores the original physical disk signature of the hard drive. Disk signatures are included in Windows Server 2003, Windows 2000 Advanced Server, and Windows NT Server 4.0 Enterprise Edition (SP3 and later) and are necessary before the hard drive can be used.
   - Restore Disk Hidden Track - this will restore the first 63 sectors of a drive. Some boot loader applications require this for the system to boot.

   Click Next to continue.

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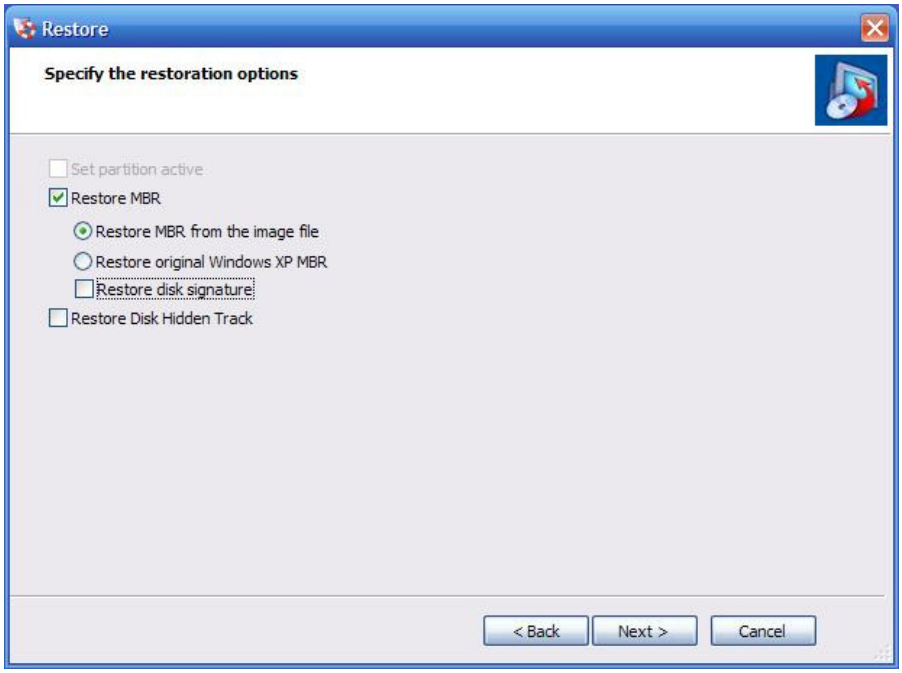

Figure 39: Specify the Restoration Options

6. This will bring up the Wizard Summary (see Figure 40). Review the Restore Wizard Summary and click Finish to start restoring the volume.

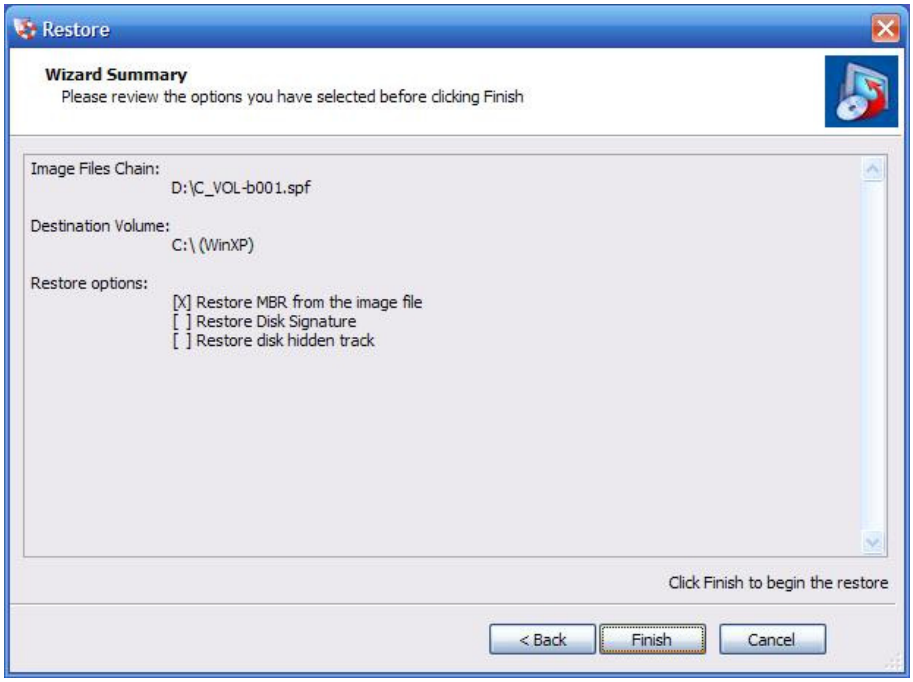

Figure 40: Restore Volume Wizard Summary

You can review the progress of restoring the volume by clicking on the Volume Restore tab associated with the restore job.

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CHAPTER 9: DISMOUNTING BACKUP IMAGE FILES

Once a ShadowProtect backup image file has been mounted using the ShadowProtect mount utility, it will remain mounted until it is dismounted or the computer where the backup image file is mounted is restarted. You can dismount a mounted backup image using the ShadowProtect Backup Image Dismount Wizard, which is available through the ShadowProtect user interface. In addition, a mounted backup image can be dismounted by accessing the ShadowProtect Dismount Wizard through a context menu option that is available on mounted backup image files.

This wizard guides you through dismounting a backup image you have previously mounted and assigned a drive letter or mount point location. The wizard will also help you save changes made to backup images that were mounted as a writeable image file.

9.1 Dismounting Backup Images Using the Context Menu

You can dismount a mounted ShadowProtect backup image file by right clicking on the mounted drive or mount point from Windows Explorer and selecting one of two ShadowProtect dismount options from the context menu. The options are Dismount or Quick Dismount which are described below.

9.1.1 Dismount

When you select Dismount from the context menu of a mounted ShadowProtect backup image file, the Backup Image Dismount Wizard will start (see *Section 9.2 Steps for Dismounting a Backup Image File Using the Backup Image Dismount Wizard*) and walk you through the steps of dismounting the image file and giving you the option to save changes made to the mounted backup image file if it was mounted as a writeable image (see *Section 7.3 Steps for Restoring Files and Folders*, which includes information on mounting a backup image file as writeable).

9.1.2 Quick Dismount

When you select Quick Dismount from the context menu of a mounted ShadowProtect backup image file, the ShadowProtect dismount utility will dismount the mounted backup image file without any further action or dialog. The image will be dismounted without saving any changes made to the mounted image file.

Note: Quick Dismount will dismount a backup image file without saving any changes made while the backup image file was mounted. If you wish to save changes, you must mount the backup image file as writeable and then dismount using the Backup Image Dismount Wizard and save changes..

9.2 Steps for Dismounting a Backup Image File Using the Backup Image Dismount Wizard

1. To start the wizard click Dismount Backup Image from the left pane of the main screen or select **Tasks** > **Dismount Backup Image** from the ShadowProtect menu bar. This will bring up the Backup Image Dismount Wizard welcome screen (see Figure 41).

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Dismount Backup Image Wizard
Welcome to the Backup Image Dismount Wizard!
This wizard will help you dismount a backup image file. If the image was mounted as a writable volume, this wizard will guide you through saving the changes made to the backup image.
Press Next to continue
< Back
Next >
Cancel

Figure 41: Backup Image Dismount Wizard Welcome Screen

2. Click **Next** to continue. This will bring up the Mounted Backup Images dialog screen (see Figure 42).

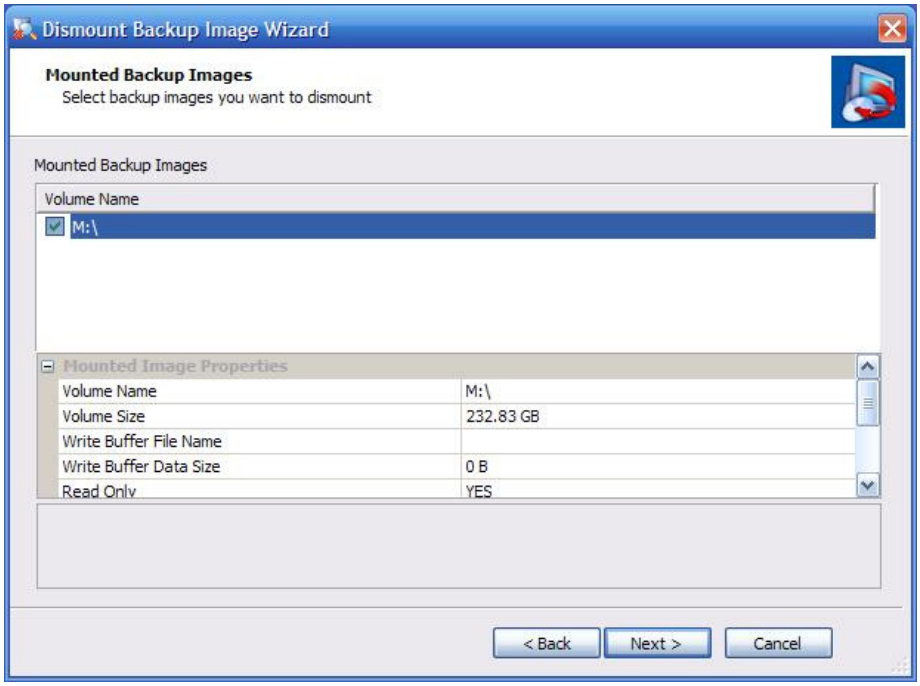

Figure 42: Select Backup Image to Dismount

3. Select the backup image volume you want to dismount by placing a check in the box next to the volume. You can also view the properties of the mounted image file in the lower window.
4. Click **Next** to continue.

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5. This will bring up the Backup Image dismount Options dialog screen (see Figure 43). If you have selected a volume that was writeable, you will have the option to save the changes you have made to that volume while it was mounted. *You can save the changes to an incremental file upon dismount.*

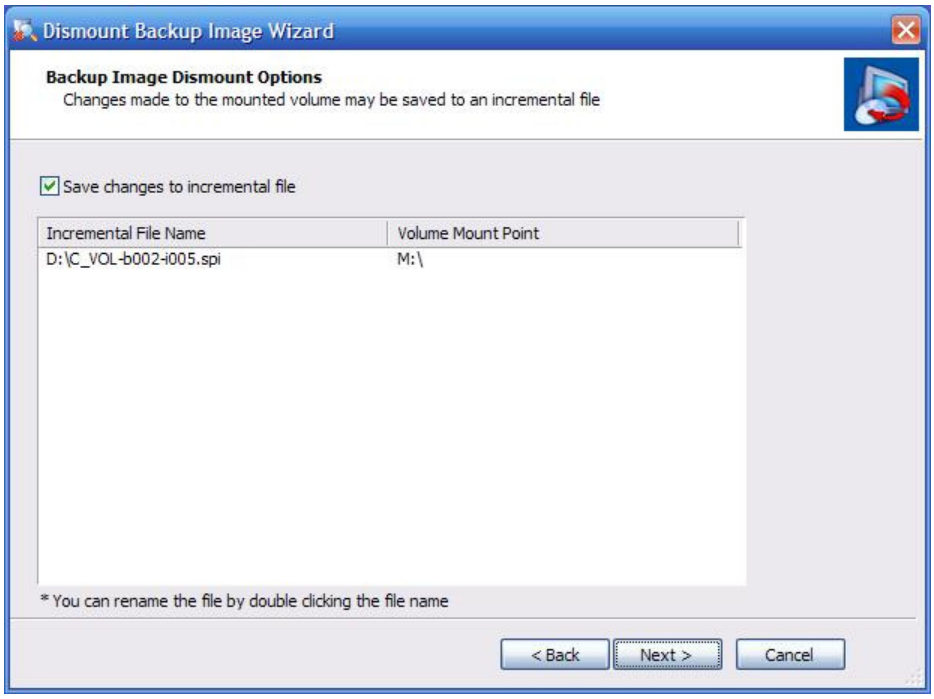
Dismount Backup Image Wizard
Backup Image Dismount Options
Changes made to the mounted volume may be saved to an incremental file
Save changes to incremental file
Incremental File Name
Volume Mount Point
D:\C_VOL-b002-i005.spi
M:\
* You can rename the file by double clicking the file name
< Back
Next >
Cancel

Figure 43: Backup Image Dismount Options

6. Select whether you want to save the changes made to the mounted volume by placing a check mark in the **Save changes to incremental file** box. You can rename the file by double clicking on it under the Incremental Name section of the screen.
7. Click **Next** to continue.
8. This will bring up the Backup Image Dismount Summary dialog screen (see Figure 44). View the summary to ensure everything is correct and click **Finish** to dismount the volume.

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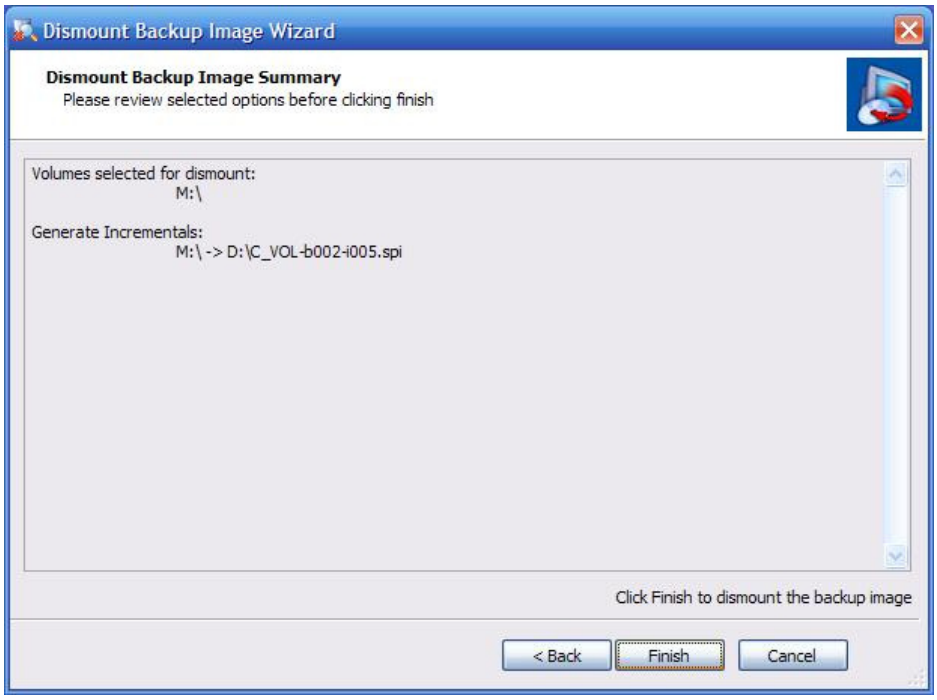

Figure 44: Backup Image Dismount Summary

Note: Backup images that have been mounted will be dismounted after a reboot or by using the Backup Image Dismount Wizard from the main screen.

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CHAPTER 10: BACKUP IMAGE TOOL

The Backup Image Tool allows you to perform the following on existing backup images:

- Change the compression on an existing image.
- Change the encryption on an existing image.
- Split an image into a spanned set, where each file in the set has a maximum file size. This is useful for moving image files to CD or DVD.
- Combine a chain of images including a base and incrementals into a single larger file.

The Backup Image Tool is available in ShadowProtect when running under Windows® and when running from within the StorageCraft Recovery Environment.

Steps for running the Backup Image Tool.

1. To start the wizard click on Backup Image Tool under Tools in the left panel of the main screen. This will bring up the Backup Image Tool Wizard welcome screen (see Figure 45). Click next to continue.

Backup Image Tool
Welcome to the Backup Image Tool Wizard!
This wizard will allow you to modify options for an existing backup image. The options that can be modified are:
· Compression
· Encryption
· Split Image
· Combine images that have been split
· Collapse all incremental changes into one base image
Press Next to continue
< Back
Next >
Cancel

Figure 45: Backup Image Tool Wizard Welcome Screen

2. This will bring up the Source Image File dialog (see Figure 46). You will need to locate the image file you wish to modify from a destination location. These destination locations can be a local directory or network share.
   - If the image file you wish to modify is located in a previously defined destination location, then select the destination and locate the backup image set from the list. The next dialog screen will let you select the specific point-in-time associated with the backup image set.
   - If the image file you wish to modify is not located in a previously defined destination location, you will need to browse to the backup image file location by clicking the Browse button.

   Click Next to continue.

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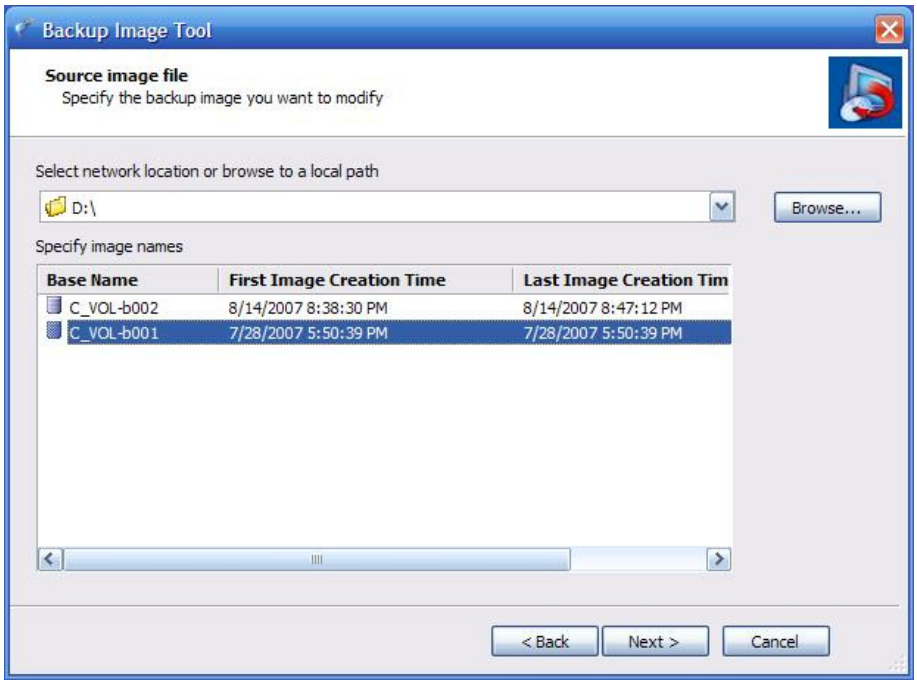

Figure 46: Specify Source Image File

3. If the backup image file is password protected you will be prompted to enter the password.
4. This will bring up the Backup Image Dependencies dialog screen (see Figure 47). Here you will be provided with all the incremental backup image files associated with the full backup image file you selected. Select a backup image file to view its properties in the right side of the dialog. Image file properties include:
   - Originating machine - the operating system version, the machine name, MAC address and the engine version of ShadowProtect used to create the image file.
   - Disk Information – disk geometry, disk size and number of the first track sectors. You can view the original disk layout in graphical form at the bottom of the screen.
   - Original Partition Information – style, number, type, bootable option, starting offset and length.
   - Image File Properties – volume size, creation time, compression, password protection, comment.

   By viewing the properties, particularly the information in the image file properties, you will be able to best select the backup image file you wish to modify. You can change your selection and review the new selection's image file properties by highlighting the image file in the left side of the dialog screen.

Note: The backup image file you select along with the image files your selection is dependent upon will be consolidated into a single new backup image file. You will have the opportunity to rename the new consolidated image file.

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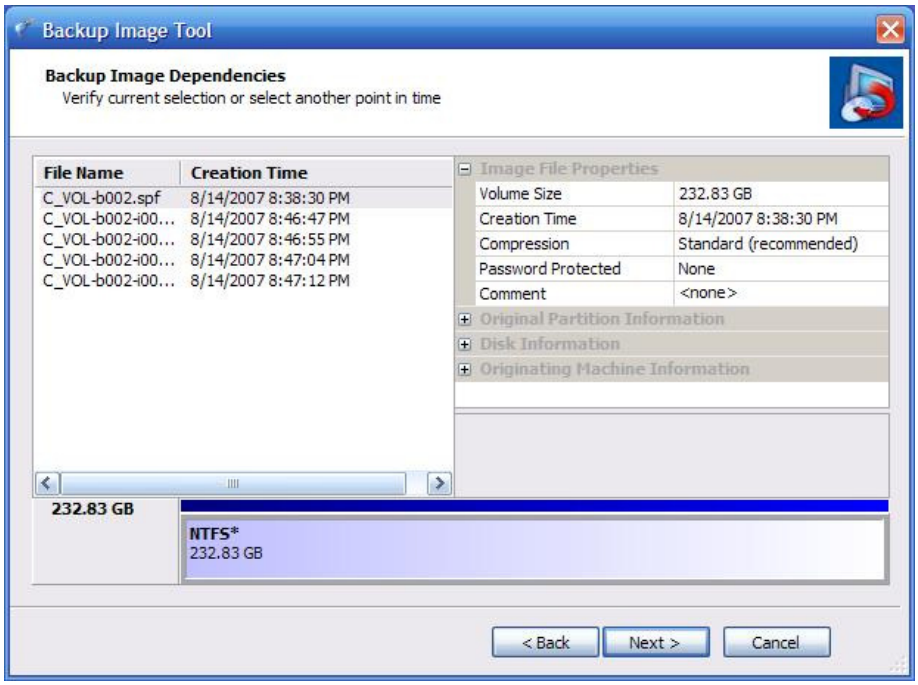

Figure 47: Backup Image Dependencies

Click Next to continue.

5. This will bring up the Destination Image File dialog screen (See Figure 48). Specify the destination object location to save the modified image file. If you need to create new destination locations click <<Network Locations…> to open the Destinations dialog, see *Section* ***Error! Reference source not found. Error! Reference source not found.***. If you wish to save the modified image file to a local directory, click the browse button to select the locations.

   Specify a name for the new modified backup image file.

   Click Next to continue.

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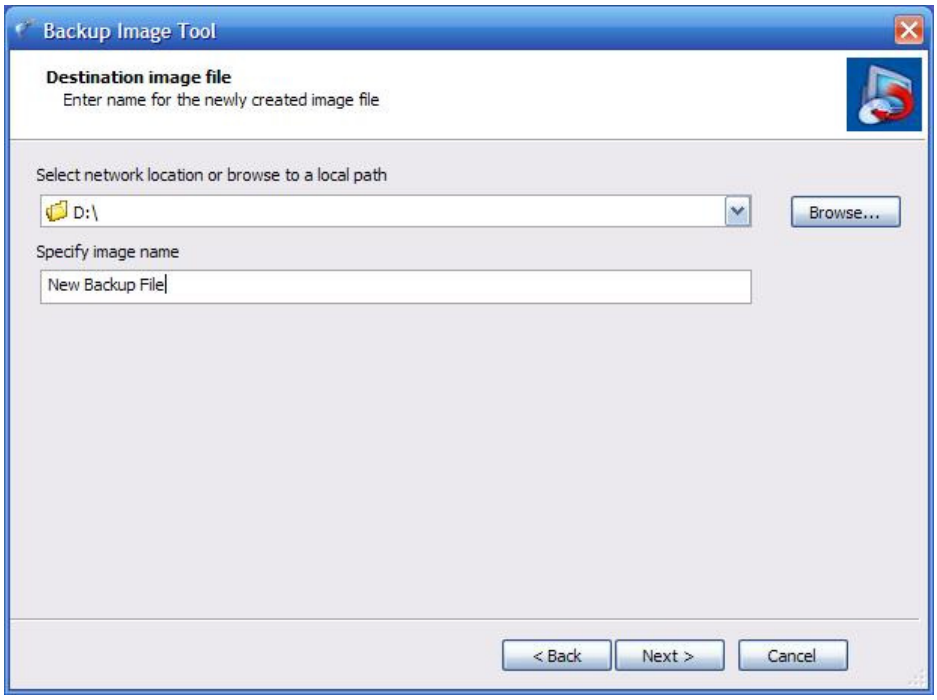

Figure 48: Backup Image Tool Destination Image File.

6. This will bring up the Backup Wizard Options dialog screen (see Figure 49). Select the compression level from the drop-down list. See *Section 5.5.3 Compression Level* for additional information.
    - (Optional) To use encryption, place a check next to Use Password. This option will encrypt the backup image file. See *Section 5.5.4 Password Encrypting Backup Image Files* for additional information.
    - Select the encryption method you want to use for the backup image by clicking the Advanced button and selecting the Encryption tab.
    - Enter a password for the backup image file. You can use alpha and numerical characters. Confirm the password by typing it again.
    - (Optional) Select whether you want the backup image file split into smaller files. If you select to split the backup image file, enter the maximum file size in megabytes for each file. See *Section 5.5.6 Splitting a Backup Image File into Smaller Files* for additional information.
    - (Optional) Enter any backup comments you want for the backup image. By default the time and date stamp are added to the backup image.

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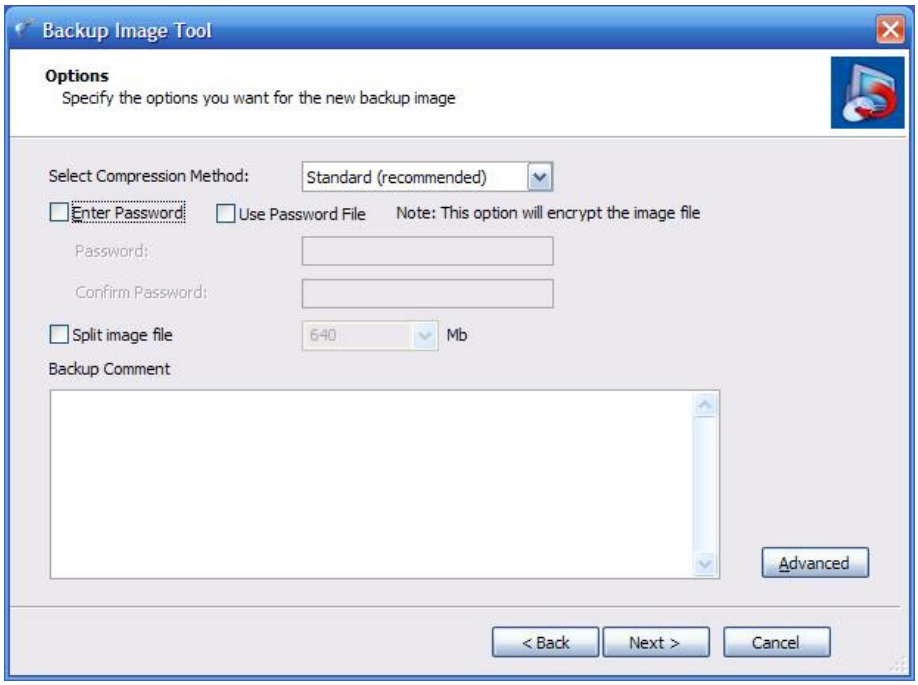

Figure 49: Backup Image Tool Options

7. (Optional) Click the **Advanced** button for advanced options. This brings up the Advanced Options dialog screen (see Figure 50). Advanced options include the following tabs:
   - Backup Options
   - Image Options
   - Commands Options
   - Encryption Options

   Click Next to continue.

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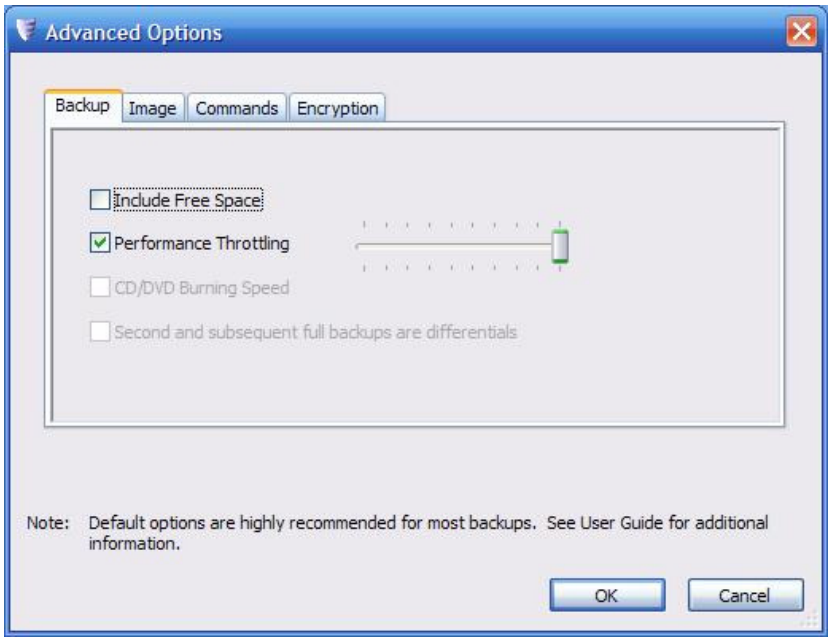

Figure 50: Advanced Options for Backup Image Tool

8. This brings up the Wizard Summary screen (see Figure 51). Review the Backup Image Tool job summary and click Finish to modify the selected backup image.

   You can monitor the progress of a job created using the Backup Image Tool by selecting the Backup Jobs tab, selecting the job and then clicking the details button. Information on the job will be presented in a tab in the lower half of the Backup Jobs tab. You may also check the results of a Backup Image Tool job that was previously executed by selecting the Backup History tab from the center panel of the main screen and clicking on the executed job.

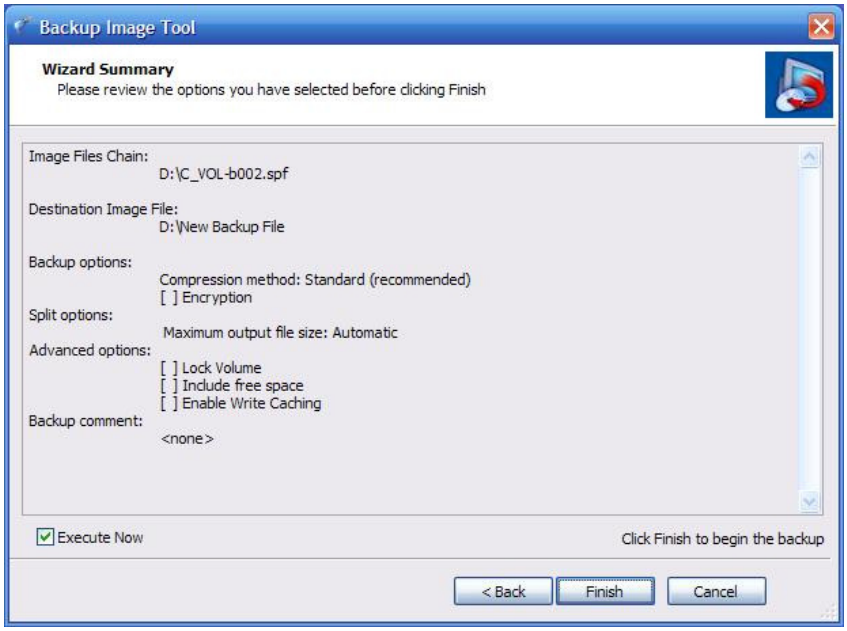

Figure 51: Backup Image Tool Wizard Summary

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CHAPTER 11: STORAGECRAFT RECOVERY ENVIRONMENT

11.1 About the StorageCraft Recovery Environment

Occasionally, a machine failure can leave the operating system inoperable. It might become necessary for you to restore a server, Server or laptop from bare metal. For these types of situations, you simply reboot the machine using the ShadowProtect Recovery CD. The machine automatically boots into the StorageCraft Recovery Environment and lets you run ShadowProtect from this Environment, including the Backup Wizard (to backup a system or volume), Restore Wizard (to restore a backup image), Browse and Restore Files Wizard (to mount an image for browsing and to perform a file-level restore), Dismount Backup Image Wizard (to dismount a mounted backup image), Verify Backup Image (to verify a backup) and Backup Image Tool (for modifying a backup image).

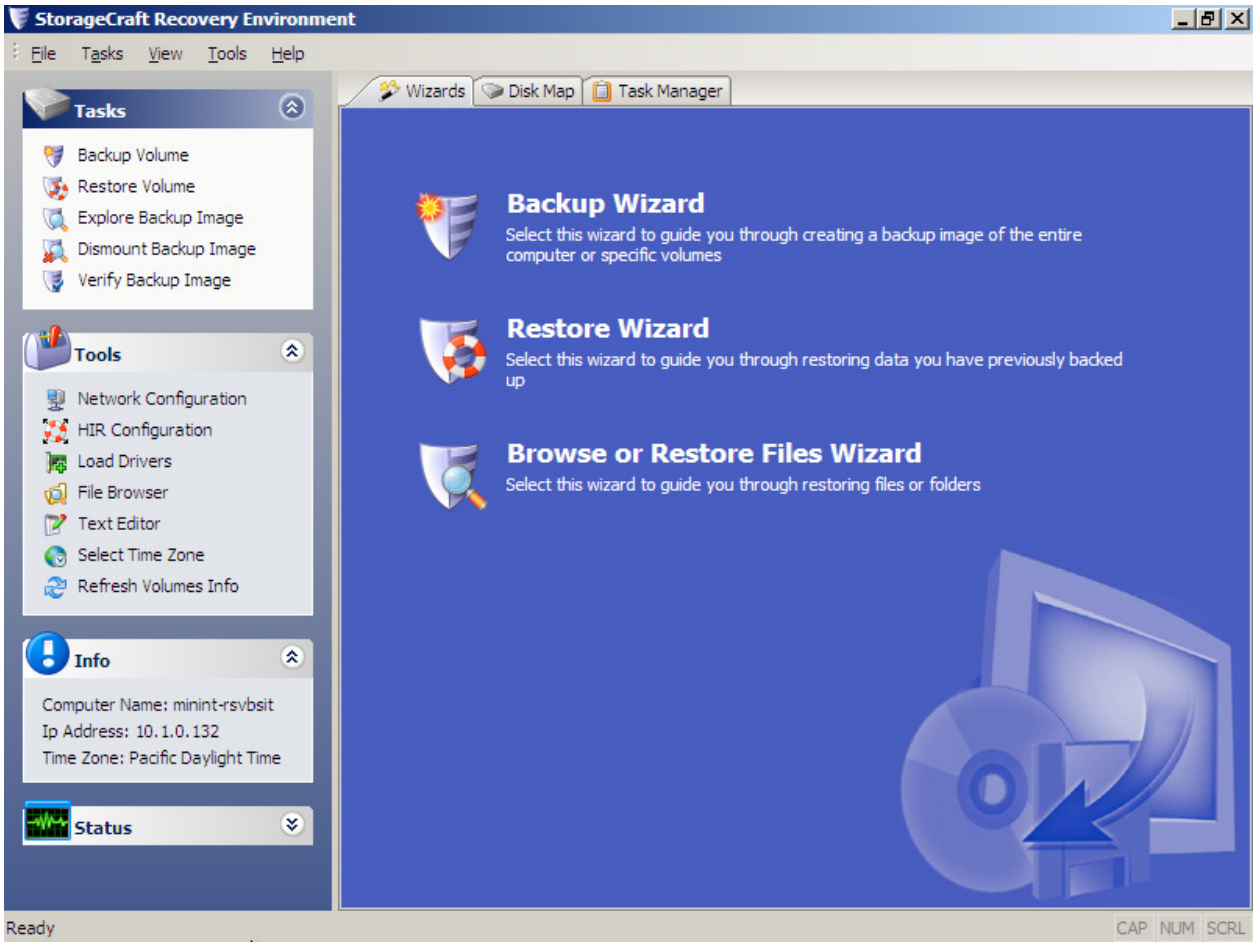

Figure 52: StorageCraft Recovery Environment User Interface

In addition to the features available while running ShadowProtect from within Windows, some additional tools are available only while running ShadowProtect from the StorageCraft Recovery Environment. These tools include:

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11.1.1.1 Network Configuration

The Network Configuration Utility is a simple tool you can use to configure your network interface cards, TCP/IP settings and domain information to recover or create images to a network device. This tool is available only from the StorageCraft Recovery Environment.

11.1.1.2 HIR Configuration

The Network Configuration Utility is a simple tool you can use to configure your network interface cards, TCP/IP settings and domain information to recover or create images to a network device. This tool is available only from the StorageCraft Recovery Environment.

11.1.1.3 Load Drivers

Use this option to dynamically load storage and NIC drivers. You can add a path to the INF files for the drivers you want to load. Drivers can be pulled from floppy disks, hard drives, USB/Firewire drives or CD/DVD media.

11.1.1.4 File Browser

A simple and intuitive tool for browsing the files and folders of a backup image. This tool is available only from the StorageCraft Recovery Environment.

11.1.1.5 Text Editor

A simple and easy to use Text Editor. This tool is available only from the StorageCraft Recovery Environment.

11.1.1.6 Vista BCD

This tool enables you to edit the BCD on systems running Windows Vista. This tool is available only from the StorageCraft Recovery Environment.

11.1.1.7 Partition Table Editor

A simple and easy to use Partition Table Editor. This tool is available only from the StorageCraft Recovery Environment.

11.1.1.8 UltraVNC

Easy to use software that can display the screen of another computer (via internet or network) on your own screen. The program allows you to use your mouse and keyboard to control the other PC remotely. This software enables you to work on a remote computer, as if you were sitting in front of it, from your current location. The UltraVNC tool is only available from the StorageCraft Recovery Environment.

11.1.1.9 Select Your Time Zone

Allows you to adjust the time zone for a system running in the StorageCraft Recovery Environment. This feature is important to ensure that the time stamping of backup image files is accurate. This tool is available only from the StorageCraft Recovery Environment.

11.1.1.10 Enable Logging

This allows you to enable logging in the recovery environment. You can specify a folder you want to save the log files to.

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Note: The Help topics are not available when running ShadowProtect from the StorageCraft Recovery Environment. It is recommended that you print a copy of the User Guide to have available for consulting while running in the StorageCraft Recovery Environment.

The StorageCraft Recovery Environment makes restoring backup images possible after almost any machine disaster. Following the restoration of a backup image, the machine is automatically rebooted and restored to its previous, usable state or to any point in time for which you have a backup. Using the HIR tool, you can restore your backup images to completely different hardware or to a virtual machine.

11.2 Booting to the StorageCraft Recovery Environment

To boot into the StorageCraft Recovery Environment follow the following steps:

1. Boot the computer using the ShadowProtect CD. The ShadowProtect CD Boot Options screen (see *Figure 53*) will display the following options:
   [1] Start StorageCraft Recovery Environment (Recommended)
   [2] Start StorageCraft Recovery Environment (Legacy)
   [3] Boot from Hard Disk
   [4] Reboot

   Select either option [1] or [2] to boot into the Start StorageCraft Recovery Environment. These options differ in the time it takes to boot into the StorageCraft Recovery Environment and the number of storage and network drivers that are supported. Option [1] is the default and contains the commonly distributed drivers and will boot much quicker relative to option [2]. Option [1] uses VistaPE which allows you to dynamically load drivers and hot plug disk devices even after the recovery environment has been booted. Option [2] contains the drivers in option [1] in addition to other less commonly distributed drivers. This environment is based off of Windows Server 2003. You should choose option [2] if you know that option [1] does not support the storage or network drivers required for your hardware or you are unable to dynamically load the drivers from Option [1].

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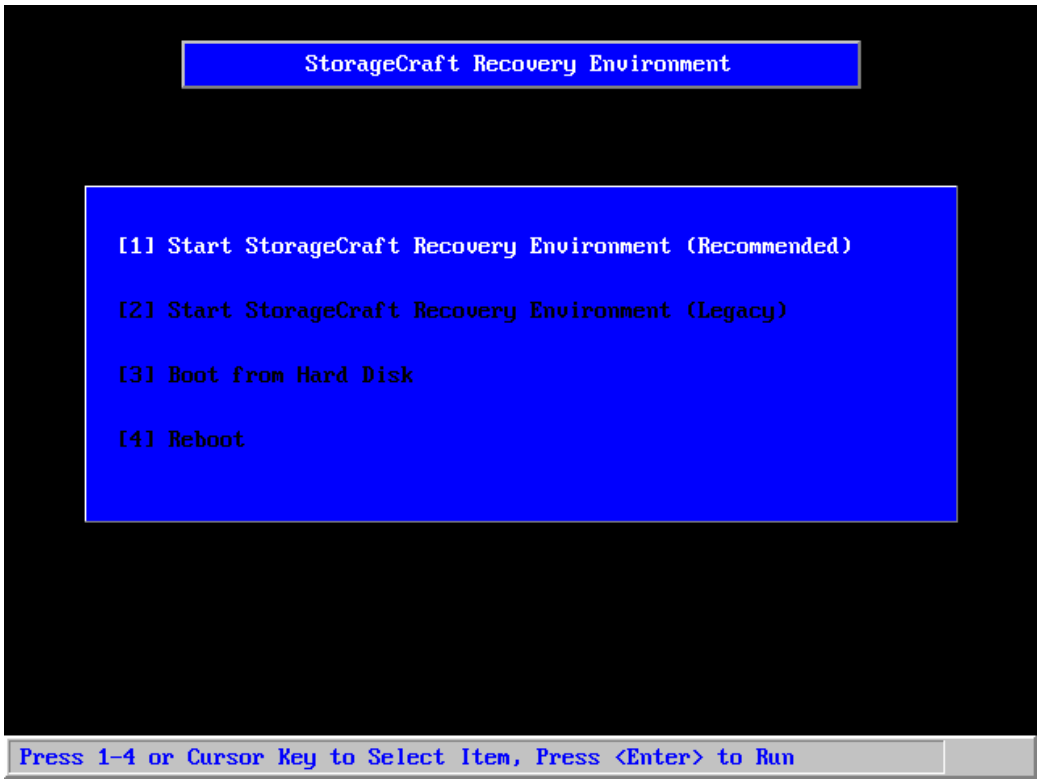
StorageCraft Recovery Environment
[1] Start StorageCraft Recovery Environment (Recommended)
[2] Start StorageCraft Recovery Environment (Legacy)
[3] Boot from Hard Disk
[4] Reboot
Press 1-4 or Cursor Key to Select Item, Press <Enter> to Run

Figure 53: ShadowProtect CD Boot Options

2. As the StorageCraft Recovery Environment loads, you will be presented with a dialog screen (see *Figure 54*) asking whether you want to start networking. Click OK to start networking.

Network Support
Click OK to start networking now or click Cancel to continue without network support.
OK
Cancel
Network support will automatically start in 27 seconds

Figure 54: Start Networking Option

3. The StorageCraft Recovery Environment user interface (see *Figure 55*) will load. You may now execute ShadowProtect tasks such as restoring a system volume, performing an HIR restore, taking a cold backup image, mounting and restoring files and folders or running one of the other StorageCraft Recovery Environment tools.

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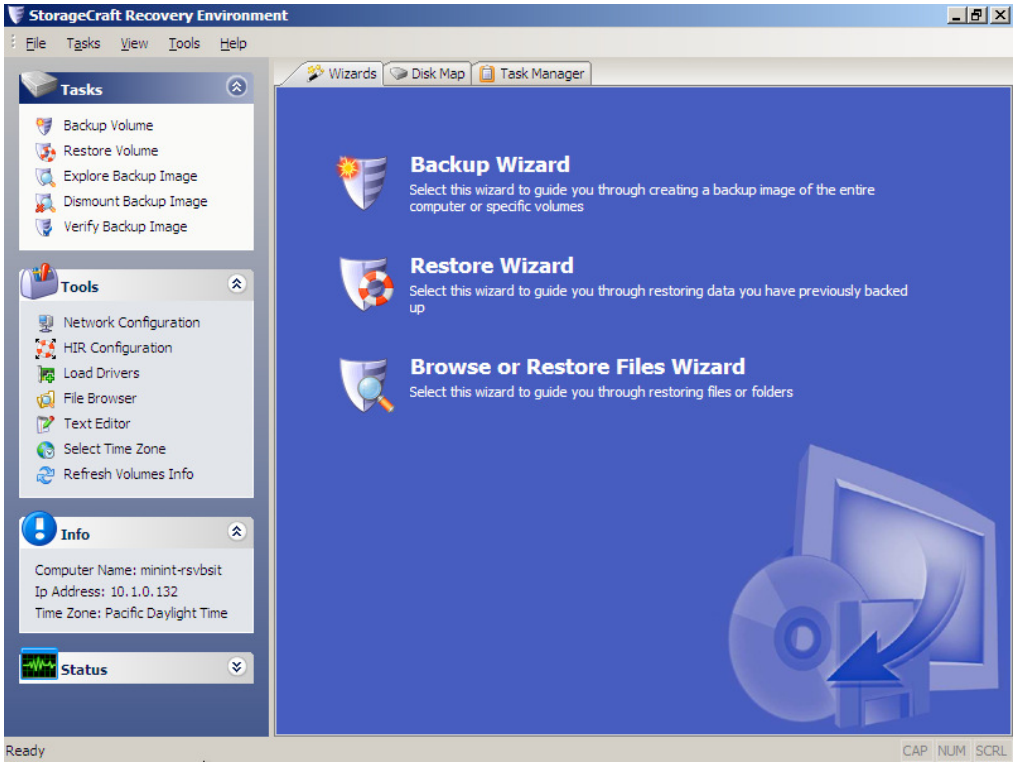

Figure 55: StorageCraft Recovery Environment User Interface

11.3 Loading Drivers in the Recovery Environment

You can dynamically load storage or network drivers from within the recovery environment. To load a driver click on the Load Drivers button in the Tools menu. (see Figure 49).

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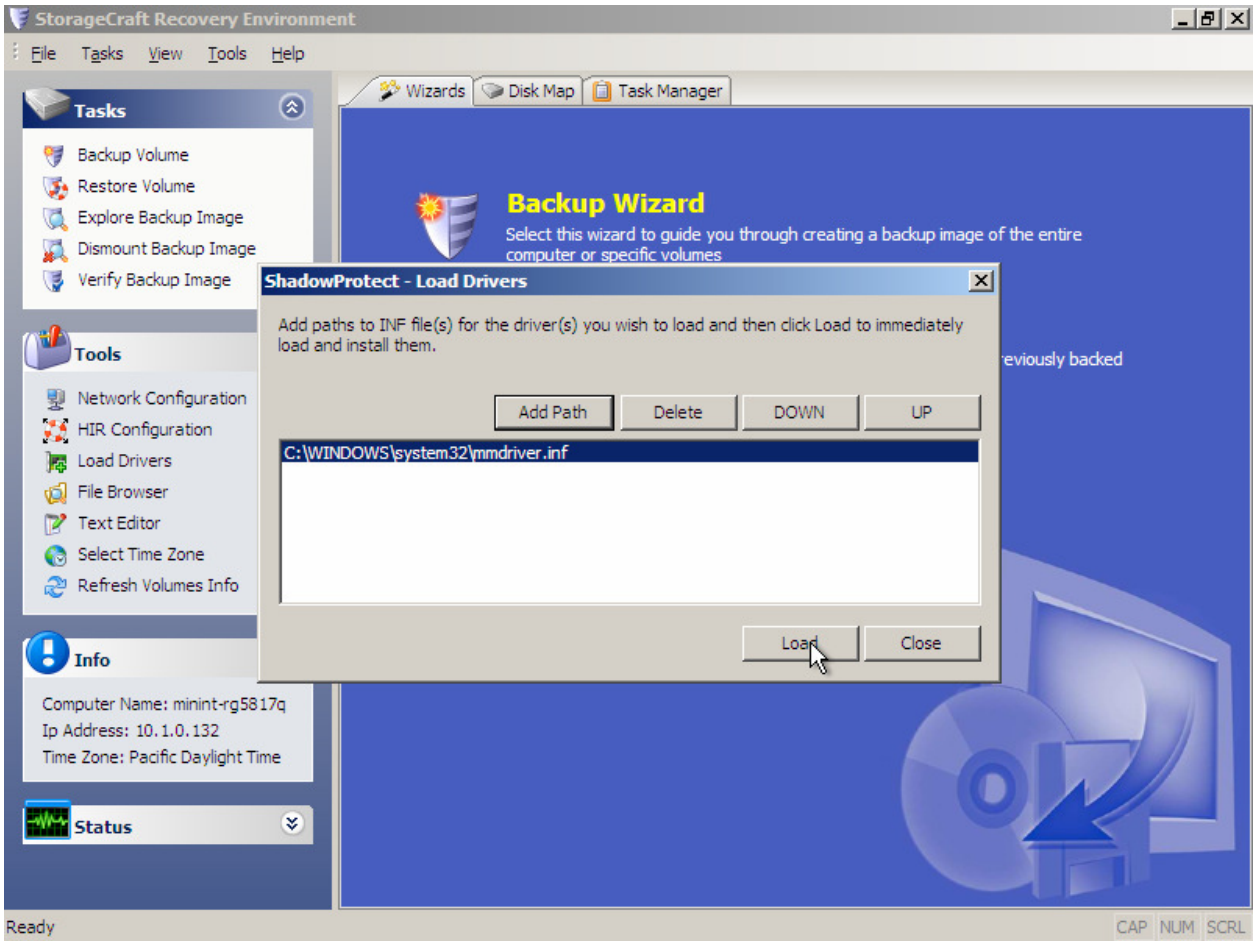

Figure 56: Loading Drivers From the Recovery Environment

You can click the Add Path button to browse for the INF file(s) you need. You can move the drivers up and down the list in order to establish priority. Once you have selected the proper driver click the Load button and your driver will be loaded and access to that device will automatically be provided.

Note: The ability to dynamically load drivers is only available in Option [1] the recommended recovery environment.

11.4 Using Hardware Independent Restore (HIR)

The HIR Configuration tool allows you to restore system images to dissimilar hardware or completely different machines or virtual environments. You can run this same tool from within the restore wizard as part of a restore, or you can run HIR as a stand alone tool. Complete the steps of restoring a backup image and then click on the HIR Configuration button in the Tools Menu.

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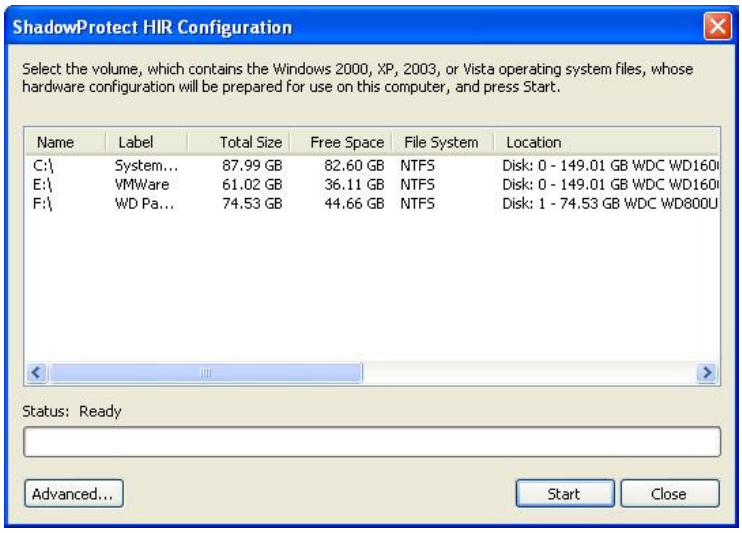

Figure 57: HIR Configuration Tool

You can select the volume which contains the Windows 2000, XP, 2003 or Vista operating system and click the Start button. This will prepare the restored volume to be bootable on the new system. If you want to run HIR as part of the restore process, simply click on the Use Hardware Independent Restore (when restoring to a different computer). You will use HIR if you are going to another physical computer (P2P), a virtual environment (P2V), from a virtual environment to a physical environment (V2P) or if you are going from one virtual environment to another (V2V).

11.5 HIR Advanced Options

There are several options available by clicking the Advanced button while in the HIR Configuration tool. You can specify directories containing the drivers you want to load during the restore operation. Simple click the New button and browse to the driver folder you want to load. ShadowProtect will use the driver directories you provide first to look for a driver match. The other two options are:

Clear existing device configuration prior to HIR -- Use this option if you the previous HIR restore failed. This will enable you to run the HIR tool without having to go through the entire restore process again.

Uninstall network cards on the target volume – Use this option if the target device is a domain controller. There are issues with domain controllers being bound to a certain network card. If you restore to a different computer that network card may not be available and could cause some issues. This option will uninstall the network card on the target system.

Note: When restoring to a virtual environment, you must first create an empty virtual machine. You can then boot the StorageCraft Recovery Environment in the virtual machine and perform the restore.

Note: When restoring using ShadowProtect, ensure you are restoring to the same size disk or to a larger disk. ShadowProtect cannot restore to a volume that is smaller than the volume used to create the backup image file.

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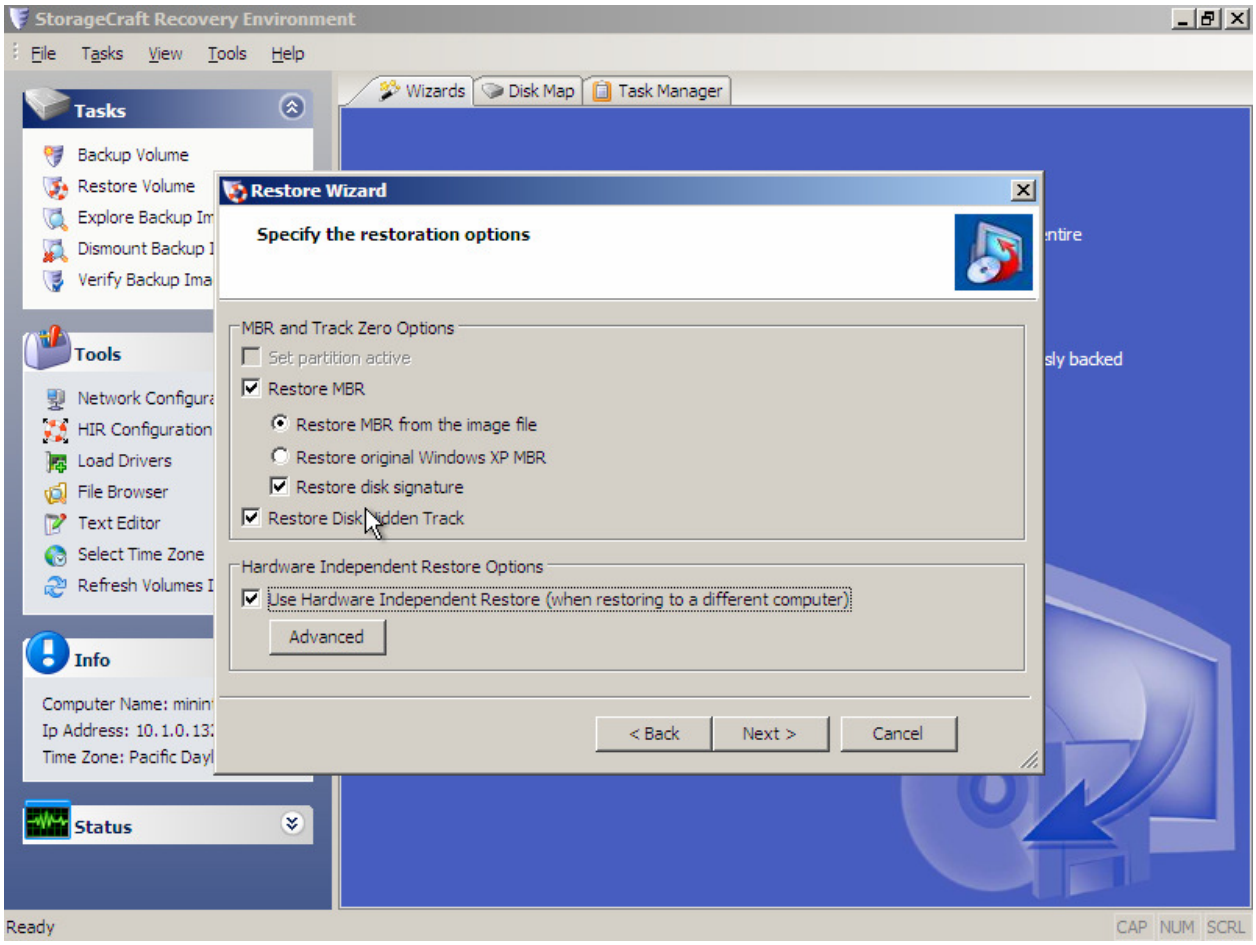

Figure 58: HIR in the Restore Wizard

11.6 Using Ultra VNC

The ShadowProtect CD contains the UltraVNC Server and UltraVNC Viewer. With these two applications, you can remotely control a computer that is booted into the StorageCraft Recovery Environment and running the UltraVNC Server using another computer that is running the UltraVNC Viewer.

11.6.1 Steps to Enabling UltraVNC Remote Management

Configuring UltraVNC Server on the computer Running in the StorageCraft Recovery Environment

1. Complete Steps 1 through 3 of *Section 11.2 Booting to the StorageCraft Recovery Environment.*
2. Once the StorageCraft Recovery Environment is running, click on the UltraVNC option in the left panel under Tools.
3. This will launch the UltraVNC Server application and prompt you to set the password to allow remote control of the machine (see Figure 59).

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Figure 59: Setting UltraVNC Password

Configuring UltraVNC Viewer on the computer to connect to the UltraVNC Server which will manage ShadowProtect remotely.

4. Using the UltraVNC Viewer, a remote computer can now connect to the computer running the StorageCraft Recovery Environment. In order to connect, the remote computer will need the following:
   - The IP address of the computer running the StorageCraft Recovery Environment which is available in the left panel of the user interface under Info.
   - The password to authenticate to the UltraVNC Server (entered into the UltraVNC Server configuration under Step 3).
5. Run the VNC Viewer. You will need to configure the VNC Viewer to connect to the VNC Server. Do the following:
   - Enter the IP address of the computer running in the StorageCraft Recovery Environment in the field labeled VNC Server.
   - Click the Connect button.
   - Enter the password to authenticate.
6. You should now have remote control of the computer running the StorageCraft Recovery Environment. You may now operate ShadowProtect as normal. See Figure 60, showing the StorageCraft Recovery Environment running remotely using UltraVNC.

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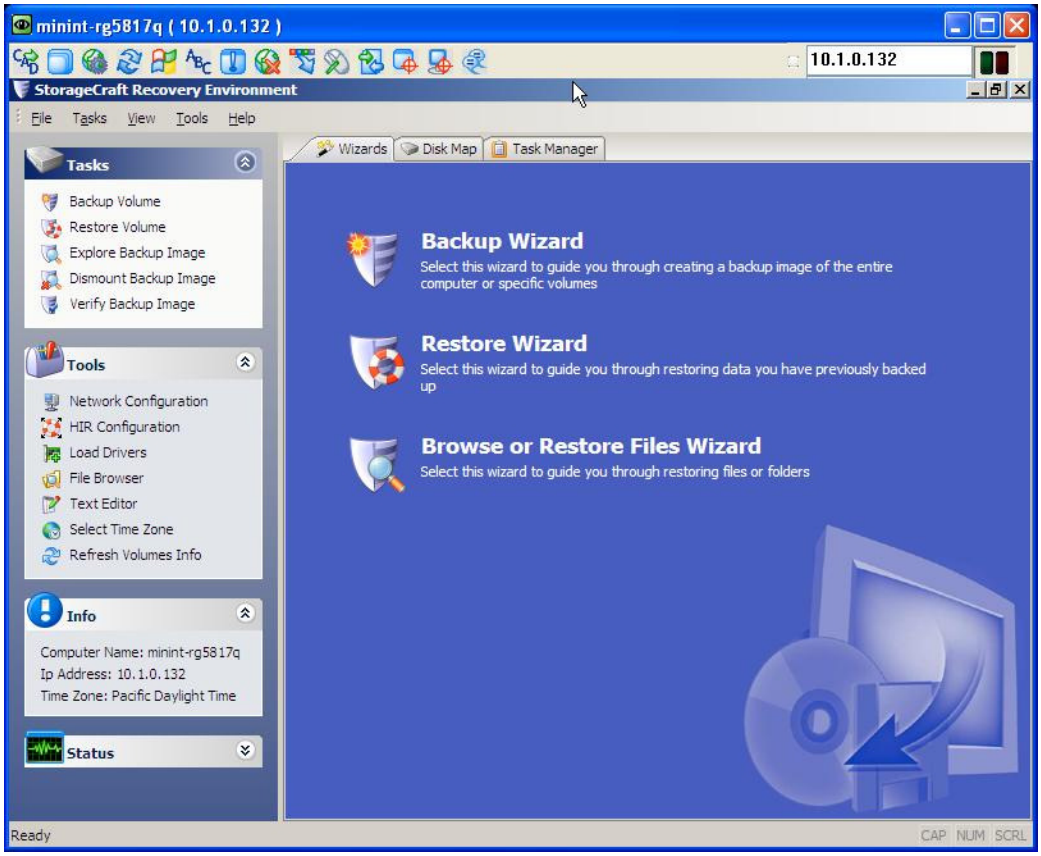

Figure 60: StorageCraft Recovery Environment Running Remotely

11.6.2 Additional Information on UltraVNC Server and UltraVNC Viewer

UltraVNC Server and UltraVNC Viewer are powerful remote control programs. For more information about these products and their license please visit the website listed below.
http://www.ultravnc.com/

11.7 Using the Network Configuration Utility

The Network Configuration Utility is a simple tool administrators can use to configure their network interface cards, TCP/IP settings and domain information to recover or create images to a network device.

When ShadowProtect loads from the StorageCraft Recovery Environment, you will be asked whether you wish to start networking (see Figure 61). By clicking OK, the StorageCraft Recovery Environment Network Configuration Utility will start. By clicking cancel, you will proceed without starting the Network Configuration Utility.

You can also manually start networking options by clicking Network configuration under the Tools menu.

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Network Support
Click OK to start networking now or click Cancel to continue without network support.
OK
Cancel
Network support will automatically start in 27 seconds

Figure 61: Start Networking option

To start the Network Configuration Utility after ShadowProtect is loaded click Network Configuration under the Tools section. This will bring up the StorageCraft Recovery Environment Network Configurator Utility (see Figure 62).

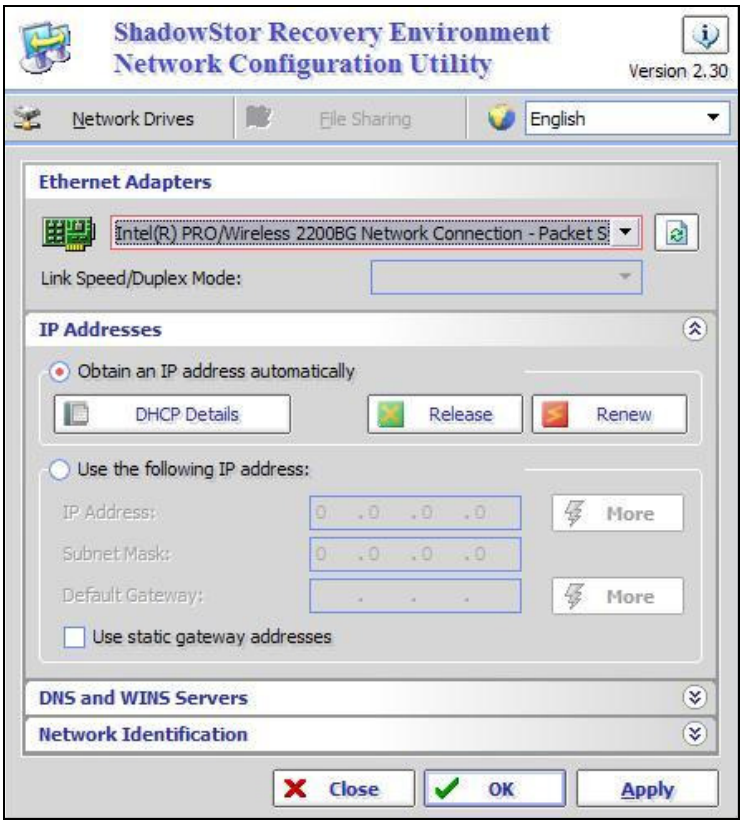

Figure 62: Network Configuration Utility Main Screen

After the Network Configuration Utility has been started, the utility lists all Ethernet adapters on the running machine and allows you to set TCP/IP properties (IP Addresses, Default Gateways, DNS Desktops, WINS Desktops - any number of them) and switch between using static and dynamic (through DHCP server) TCP/IP settings at any time.

Using the Network Configuration Tool you can also:

- You can add any Domain, workgroup, or Server to browse its resources (desktops with their IP addresses, and shared folders) and map and disconnect network drives (See Figure 63).
- You can change the computer name and join workgroups.
- You can select Link Speed/Duplex Mode of a broad range of Ethernet adapters.

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- You can release and renew the IP address of any Ethernet Adapter.

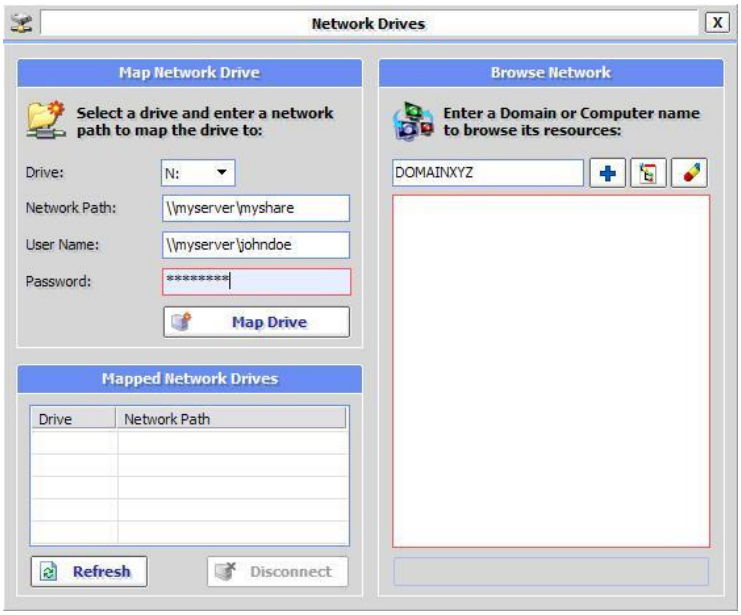

Figure 63: Browse Network and Map Drives

11.8 RECOVERING A SYSTEM VOLUME

If you need to restore a backup image file of a system volume, you use the ShadowProtect CD to boot the computer into the StorageCraft Recovery Environment. The StorageCraft Recovery Environment operates in essentially the same manner as ShadowProtect does while running under Windows. In order to have access to network drives, ShadowProtect comes with a network configuration utility (see *Section 11.7 Using the Network Configuration Utility*) and the remote control application UltraVNC to enable remote control of a computer running the StorageCraft Recovery Environment (see *Section 11.6 Using Ultra VNC*). In addition, the StorageCraft Recovery Environment comes with an assortment of additional tools to make operating the StorageCraft Recovery Environment outside of Windows® more simple. For additional information on these tools see *Section 11.1 About the StorageCraft Recovery Environment*.

Note: The StorageCraft Recovery Environment requires a minimum of 256 MB of RAM.

Note: The ShadowProtect CD must remain loaded at all times to run the StorageCraft Recovery Environment when booting to the Legacy option. Therefore, you may only restore a backup image file that is on a local or network disk or from a second CD or DVD drive.

The following steps will guide you through performing a bare metal recovery of a system volume. Some steps are optional or only apply to certain circumstances such as using the remote control application or networking.

1. If the backup image you wish to restore is located on a USB drive, attach that to the computer.
2. Insert the ShadowProtect CD into the CD drive of your computer.
3. Restart the computer. You may need to modify the boot options to have the computer boot to a CD drive.
4. When prompted, select to boot from CD, either option [1] or option [2]. See *Section 11.2 Booting to the StorageCraft Recovery Environment*, for additional information.If you need to install storage drivers for the computer's hard disk subsystems, press F6 when prompted.
5. (Optional) You will be asked whether you want to start networking. Depending on whether you need to have network access or wish to use the UltraVNC remote control application select to start networking. Otherwise select to not start networking.

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6. Use UltraVNC for remote control of the StorageCraft Recovery Environment (see *Section 11.6.1 Steps to Enabling UltraVNC Remote Management* for additional information).
7. You may now run the Restore Wizard to restore the system volume (see *Section 8.1 Steps for Restoring a Volume* for additional information).
8. Once the Restore Wizard completes, you can reboot the system to the restored system volume.

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CHAPTER 12: REMOTE MANAGEMENT

ShadowProtect's user interface features a network view, which allows users to remotely manage ShadowProtect Backup Agents that are installed on other Desktops and desktops and are accessible on a local area network or through a virtual private network (VPN). Using the network view and connecting to a remote node on the network, all the features and functionality of ShadowProtect are available to the remote user.

To expose or hide the network view, click on "Network View" in the left panel of the main screen. This will toggle on or off the right panel (or "Network View") of the main screen. With the network view exposed, you can do the following:

- Connect to a node
- Disconnect a node
- Add a node
- Delete a node
- Review the properties of a node
- Fully manage the ShadowProtect Backup Agent on a connected node

Note: You must setup remote management using a user with administrative rights to the remote node.

12.1 Connect to Remote Nodes

You can connect to a remote node by selecting the node from the list and clicking the Connect button. You must have previously added the node in order to connect to a remote note, see Section 12.3 *Adding Remote Nodes*.

You can review the nodes available to connect and get additional details on that node by reviewing the properties for a selected node.

You can only be connected to a single node at a time, so if you connect to a new node, you will be automatically disconnected from the node you were connected to.

12.2 Disconnect from Remote Nodes

You can disconnect from a remote node by selecting the node and clicking the Disconnect button.

Note: When you disconnect from a node, you do not stop the ShadowProtect Backup Agent or affect any of the scheduled operations of ShadowProtect. You only unplug the user interface for remote management of ShadowProtect.

12.3 Adding Remote Nodes

Prior to managing a remote node, you must add the node to the user interface of the machine you wish to manage the remote node from. To add a remote node, do the following steps:

1. Click the Add button. This will create a new node named New Node 1.

2. In the properties tables below the remote node list you must enter the properties for the new node:

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General properties

- **Server Name** – Enter a name for the new node. The name you enter is the name that will be used to identify this node from the list of nodes.
- **Server Address** – Enter the machine name or ip address for the node. If you wish to browse for the machine to find the address, click in the field right of Server Address and click the ... button.
- **Server Description** – Enter a description of the computer. This is for your information and is not used to remotely manage the node.
- **Status** – You cannot edit this field. This field indicates whether the node is connected or disconnected from the user interface.

Authentication properties Settings

- **Domain Name** – Enter the domain name.
- **User Name** – Enter a user name that has administrator rights to the node.
- **Password** – Enter the password for the user name.

3. The remote node is now added to the user interface. You can now connect to the remote node and manage ShadowProtect.

Note: You can remotely manage ShadowProtect Desktop Edition and ShadowProtect Desktop Edition, through the user interface.

12.4 Deleting Remote Nodes

If you wish to delete a remote node from your user interface, either because the node no longer exists or you do not wish to remotely manage the node, select the node and click the Delete button. You can re-add the node if you choose to remotely manage the node later.

When you delete a node from a user interface, you do not delete the program or its configured operation on the node, or from any other computers that have added the node for remote management. You only remove the node from the available nodes in the remote management panel on the machine in which the node has been deleted.

Note: You cannot delete the local node from the remote management view.

12.5 Properties Information for Remote Nodes

The properties table displays the properties of the selected node. You can edit the properties of the selected node as long as the node is not connected. The properties table contains the following information about the selected node:

General

- **Server Name** – This is the node name that is used to identify the computer in the node list. You can update this information by entering a new name.
- **Server Address** – This is the machine name or IP address used on the network for identifying the computer. You can update this information by entering a new machine name or IP address. You can also enter the address by clicking in the field to the right of Server Address and then clicking the ... button and browsing the network and selecting a machine.
- **Server Description** – This is additional information about the remote computer. This information is not used by ShadowProtect, it is available to provide users additional information about the computer.
- **Status** – You cannot edit this field. This field indicates whether the node is connected or disconnected to the user interface.

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Authentication Settings

- **Domain Name** – the domain name to which the remote node belongs.
- **User Name** – a user name on the remote node. This user name must have administrative rights to authenticate.
- **Password** – the password for the user name.

You can hide or expose the properties table by clicking the Properties button.

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CHAPTER 13: OTHER OPERATIONS

13.1 Log Files

ShadowProtect creates and makes available a log file for each backup job. This log file provides information about the backup job results, including the reason for failure, if any.

To review the log file for a backup job, select the Backup History tab. Backup jobs are presented in the list. Each backup job presents the Start Time, End time, Type of backup (Full or Incremental), Source, Destination and Status. Backup jobs that finished successfully will be designated with a status of "completed."

Any job that did not complete successfully, with have a red circle with a white "X" to the left of the job entry. These jobs will also have a status other than "Completed," such as "Failed" or "Aborted." It is important to review these entries and determine why the job failed.

You can sort the backup history by a specific parameter, by clicking the header of the column you wish to sort by. You can also adjust the column width by dragging the borders with the mouse.

To view the details of the job, select the job you wish to review and then click the "Details" button. This will reveal the details of the selected job in a window below the Backup History list. You can review the details of the job.

To delete backup job history, you can delete a single entry by selecting the entry from the backup history list and clicking the "Delete" button. You can also delete the entire backup history by clicking "Delete All."

13.2 Email Notification

13.2.1 Configuring Email Notification

ShadowProtect can be configured to send email notifications on the success or failure of a backup job. To setup email notifications select **Options** > **Agent Options** from the ShadowProtect menu bar. This will launch the Agent Options dialog screen (see Figure 64). To configure email notifications you must provide the following information:

- **SMTP Server** – type the name of the SMTP server to use in sending the email notification (for example emailserver@domain.com)
- **Email From Address** – enter the email address of the sender.
- **Email To Address** – enter the email address where the notification will be sent.
- **Send Email on Success** – by default this option is set to off. If you want an email notification sent on each successful backup operation, toggle this setting to "Yes."
- **Send Email on Failure** – by default this option is set to "Off." If you want an email notification sent on each unsuccessful backup operation, toggle this setting to "Yes."

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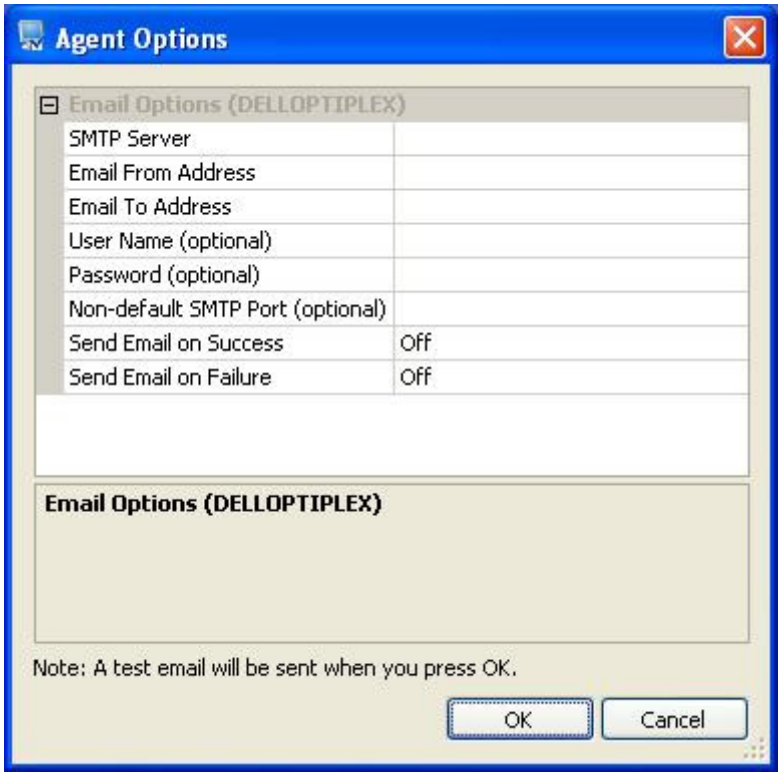

Figure 64: Agent Options dialog screen

13.2.2 Email Notification Information

ShadowProtect email notifications contain the following information.

- **Subject line** – will indicate that ShadowProtect was successful or unsuccessful in backing up the machine name, depending on the type of email notification.
- **Email contents –** the email will contain the following information in the body of the email message.
  - Start time
  - Finish time
  - Source volume
  - Destination path

13.2.3 Test Email Notification

Test that email notification was configured properly by taking a backup image and having an email notification sent on successful completion of a backup job. Any changes you make to the Agent Options dialog box will result in sending a test email once you click the OK button. Once you have verified that email notification is working as expected, you can implement your notification policy as desired.

13.3 Deleting Backup Image Files

Before deleting backup image files, you should be certain that none of the backup image files are required for any active backup jobs, or that other backup image files your might need are dependent on these images. To check backup image file dependencies, use the Backup Image Tool to determine image file dependencies.

Note: If you delete a backup image that other point-in-time backup image files are dependent upon, you will render the dependent backup images files useless. You will not be able to browse and restore files using these dependent backup image files.

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Note: If you delete the full image to an active backup image job, the job take another full image during the next scheduled backup and will start a new backup image set.

13.4 Checking and Verifying Backup Image Files

It is important to verify the quality and integrity of your backup images on a routine basis. The best way to check a backup image files, is to mount a backup image and browse the files and folders. This will help ensure that your backup image will be ready when you need them. You can also run the Verify Image Wizard from within the user interface.

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CHAPTER 14: BEST PRACTICES

- **Turn off disk defragmenter software if using incremental backups**. When you take an incremental backup, you are writing a file of only the sectors which have changed since the last full or incremental backup image was taken. If you run disk defragmenter software, you will be changing the sectors on the disk and cause the time and size of the incremental backup image to greatly increase. If you want to run disk defragmenter software, it is recommended that you do it before you run a full backup image and then do not run or schedule the disk defragmenter software to run while ShadowProtect is scheduled to take incremental backup images.
- **Test the StorageCraft Recovery Environment**. Ensure you can properly boot your system and gain access to both the local drives and network devices from which you might need to recover.
- **Monitor disk space usage where images are stored.** It is important to monitor the disk space where you are storing ShadowProtect backup image files, to ensure there is adequate space available. If there is insufficient storage space, the backup jobs will fail.
- **Monitor the ShadowProtect log files.** Routinely examine the ShadowProtect log files. The log files will provide status of backup jobs, letting you know the backup jobs were completed successfully or if the backup jobs failed. If the backup job failed, the log files will provide details of the failure allowing you to take action to correct the situation.
- Backup the system and data to disk first and then to all your tape backup software to backup the images for offsite storage
- **Use password encryption to protect backup image files.** Since ShadowProtect backup images include all the contents of the disk drive, you should use password encryption to ensure the security of the data.
- **Include multiple volumes in your backup job.** If you have databases or applications that span volumes, then include multiple volumes in your backup job. ShadowProtect's snapshot can operate simultaneously on multiple volumes, thereby ensuring the consistency for these applications and databases.
- **Periodically save your backup files on a removable hard drive, CD/DVD/Blue-Ray or tape media** so you can store the backup in a safe place, preferably at a site away from the machines you are protecting. This will ensure you have an available backup image to which you can restore in case a disaster destroys the hard drive where your online backups have been stored.
- **Use the Backup Image Tool** to manage backup images such as consolidating backup images or to split backup images in order to move images to CD or DVD. Also use the Backup Image Tool to apply new password encryption to previously taken backup images in the event the passwords were compromised or you suspect they might have been compromised.
- **Use email notification** to keep you up-to-date and informed of the success and/or failure of backup jobs so that you can quickly rectify the problem.
- **Use a retention policy that maximizes the point-in-time histories.** Review the options available in the ShadowProtect for retaining point-in-time histories, including using differentials for second and subsequent full images.
- **Specify drivers for HIR – If the HIR function is not successful, you can use the Advanced button and add your own drivers. This will improve the likelihood of having a successful restore or a backup image to different hardware.**

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APPENDIX A: PRODUCT SUPPORT

Technical support for StorageCraft products is available beginning with the release of the product and ending six months after the release of the next major version of the product or after StorageCraft discontinues the product line.

A.1 Complimentary Technical Support

StorageCraft complimentary technical support consists of self-help support tools that are available at www.storagecraft.com/support.html (in English only), and an easy-to-use, powerful knowledge base that helps you find answers to the most frequently asked product questions, as well as "how-to" procedures and technical information about all StorageCraft products.

A.2 E-Mail Support

Requests for e-mail support in North America are processed 8:00 am to 5:00 pm MST, Monday through Friday. To obtain e-mail technical support for specific technical questions or issues, fill out the form at www.storagecraft.com/supportform.html. Please provide as much detail as possible to help the technical support engineers understand and diagnose the issue.

In order to ensure efficient service, please provide at a minimum the following information:

- Product name and version number
- Detailed problem description, error code, log file description, etc.
- Hardware and software configuration, operating system version, service pack number, etc.

A.3 Telephone Technical Support

StorageCraft support engineers are available Monday through Friday 9:00 A.M. to 5:30 P.M. (MST), except for business holidays. To reach the StorageCraft technical support team, please call: (801) 545-4710. Telephone support is available to all customers with a current maintenance plan or customers who have purchased technical support from the StorageCraft webstore. If you are not immediately conntected to a support engineer, leave a message and the next available support engineer will return your call.

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APPENDIX B: COMMON RETENTION POLICY CONFIGURATIONS

ShadowProtect employs a method for maximizing point-in-time backup images while minimizing storage consumption. This approach is unique to image-based backup and disaster recovery products. ShadowProtect is capable of intelligently utilizing full images, differential images and incremental images in a retention policy for a scheduled backup job. What this means is that ShadowProtect is capable of retaining more point-in-time history while simultaneously consuming substantially less storage space.

Figure 65 presents four common implementations of retention policies that can be set when defining a scheduled backup job. The table contained in Figure three shows the relative performance of four different metrics for each backup retention policy configuration. For additional information on defining a scheduled backup job and retention policy configuration, see *CHAPTER 5: CREATING BACKUP IMAGE FILES.*

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	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Use Differentials	X	X		
Delete Only the Incrementals	X		X	
Delete the Full and Incrementals		X		X
Image Set 1	C_Vol-b001	C_Vol-b001	C_Vol-b001	
Image Set 2	C_Vol-b001-d001		C_Vol-b002	
Image Set 3	C_Vol-b001-d002		C_Vol-b003	
Image Set 4	C_Vol-b001-d003		C_Vol-b004	
Image Set 5	C_Vol-b001-d004		C_Vol-b005	
Image Set 6	C_Vol-b001-d005 C_Vol-b001-d005-i001 C_Vol-b001-d005-i002 C_Vol-b001-d005-i003	C_Vol-b001-d005 C_Vol-b001-d005-i001 C_Vol-b001-d005-i002 C_Vol-b001-d005-i003	C_Vol-b006 C_Vol-b006-i001 C_Vol-b006-i002 C_Vol-b006-i003	C_Vol-b006 C_Vol-b006-i001 C_Vol-b006-i002 C_Vol-b006-i003
Image Set 7	C_Vol-b001-d006 C_Vol-b001-d006-i001 C_Vol-b001-d006-i002 C_Vol-b001-d006-i003	C_Vol-b001-d006 C_Vol-b001-d006-i001 C_Vol-b001-d006-i002 C_Vol-b001-d006-i003	C_Vol-b007 C_Vol-b007-i001 C_Vol-b007-i002 C_Vol-b007-i003	C_Vol-b007 C_Vol-b007-i001 C_Vol-b007-i002 C_Vol-b007-i003
Image Set 8	C_Vol-b001-d007 C_Vol-b001-d007-i001 C_Vol-b001-d007-i002 C_Vol-b001-d007-i003	C_Vol-b001-d007 C_Vol-b001-d007-i001 C_Vol-b001-d007-i002 C_Vol-b001-d007-i003	C_Vol-b008 C_Vol-b008-i001 C_Vol-b008-i002 C_Vol-b008-i003	C_Vol-b008 C_Vol-b008-i001 C_Vol-b008-i002 C_Vol-b008-i003

Relative Rank Across Scenarios

CPU Utilization	2[1]	2[1]	1	1
Network Utilization	2[2]	2[2]	1	1
Storage Requirement	2	1	4	3
Point-in-time History	1	2	1	3[3]

1 On machines using local storage the difference between scenarios is minimal. However on machines using network storage, the difference in CPU utilization is more apparent.

2 On machines using local storage this is not a consideration

3 The only difference between Scenario 2 and 4 is the unique information retained in the first full image.

Figure 65: Comparison of Full with Incremental Backup Configurations with Retention Policy Set to Retain the Three (3) Most Recent Image Sets.

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APPENDIX C: GLOSSARY

Backup – Backup is the activity of copying files or databases so that they will be preserved in case of equipment failure or other catastrophe. For personal computer users, backup is also too often neglected. The retrieval of files you backed up is called *restoring*.

Backup Image File – Images are files that contain all the contents of a hard drive for the purposes of backing up a computer system. Images are used to restore computer systems to a desired point-in-time.

Bare Metal Recovery (Restore) – The complete recovery of a computer after a catastrophic failure. It includes the restoration of the operating system, file system, partitions, volumes and data, from a complete backup image. An example is restoring a .spi file created using ShadowProtect.

Base Image File – Also referred to as *Full Image File*. Backup files containing the sectors that have changed on a drive since the base backup was taken. Differential backups require less drive space than a full backup, so they are useful if you want to backup your drive more often without consuming a lot of drive space. When you restore a drive (or files and folders) to a point-in-time using a differential, the base image and the differential image are used to restore the system or volume.

Basic Disk – A basic disk is a physical disk that can be accessed by MS–DOS and all Windows-based operating systems. Basic disks can contain up to four primary partitions, or three primary partitions and an extended partition with multiple logical drives.

Continuous Incrementals – A schedule type for ShadowProtect. This schedule allows you to take ONE base and then incremental backups from that point on without the need to ever take a new full backup.

Compression – A technology that reduces the size of a file. Compression is valuable because it can help save time, bandwidth and storage space.

Differential Image File – Backup files containing the sectors that have changed on a drive since the base backup was taken. Differential backups require less drive space than a full backup, so they are useful if you want to backup your drive more often without consuming a lot of drive space. When you restore a drive (or files and folders) to a point-in-time using a differential, the base image and the differential image are used to restore the system or volume.

Disaster Recovery – The ability to recover from the complete loss of a computer, whether due to natural disaster or malicious intent. Disaster recovery strategies include replication and backup/restore.

Disk Device – A local disk drive, including attached USB or FireWire disk drives as well as network drives including SAN, NAS, iSCSI, SCSI, USB or FireWire.

Driver – A driver is a program that interacts with a particular device or special (frequently optional) kind of software. The driver contains the special knowledge of the device or special software interface that other programs using the driver do not contain.

Drive Letter – See *Mount as Drive Letter*.

Dynamic Disk – A dynamic disk is a physical disk that provides features that basic disks do not, such as support for volumes spanning multiple disks. Dynamic disks use a hidden database to track information about dynamic volumes on the disk and other dynamic disks in the computer.

Encryption – A procedure that renders the contents of a file unintelligible to anyone not presenting the proper credentials to read it.

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ExactState Imaging™ – The ability to create an image during a point where the system is in the best state for backup, including no open files. (A trademark of StorageCraft Technology Corporation.)

Full Image File – See *Base Image File*.

Hard Drive – A hard disk is part of a unit, often called a "disk drive," "hard drive," or "hard disk drive" that stores and provides relatively quick access to large amounts of data on an electromagnetically charged surface or set of surfaces.

Hot Backup – A backup image taken in real-time without interrupting system operation on the computer or server. Hot backup of a system volume requires the use of a snapshot filter driver (see Snapshot).

Hot Restore – The restoration of a backup image while the computer or server remains up and running.

Note: Restoring the system volume cannot be done hot.

Image or Image File – see *Backup Image File*.

Image Set – If you use a base image and incremental images to back up a drive, the combination of the base image and incremental images is called an image set. When you restore to a given point-in-time, the base image and all the incremental images taken up to that point-in-time are used to restore the system or volume.

Incremental Image File – Backup files containing the sectors that have changed on a drive since the last incremental backup was taken. Incremental backups are faster to create and require less drive space than a full backup, so they are useful if you want to backup your drive more often using less time and storage space compared to a full backup. When you restore a drive (or files and folders) to a point-in-time and you have used a base image with incremental backups, the base image and the incremental images up to that point-in-time are used to restore the system or volume.

Lock Volume – a request by the software to gain exclusive access of a selected drive. By locking the volume, you prevent other software programs from changing the file system or opening files during the process of writing the image file.

Microsoft Volsnap – Microsoft's proprietary snapshot.

Microsoft Volume Shadow Copy Service (VSS) - Provides backup infrastructure for Microsoft Windows XP and Microsoft Windows Server 2003 operating systems, as well as a mechanism for creating consistent point-in-time copies of data. The Volume Shadow Copy Service can produce consistent snapshots by coordinating with business applications, file-system services, backup applications, fast-recovery solutions, and storage hardware.

Mount as Drive Letter – the process of matching volumes (active primary partitions and logical partitions) to letters in the root namespace of a file system as seen by a Microsoft operating system. Unlike the concept of mount points, where the user can create directories of arbitrary name and content in a folder namespace, drive letter assignment implies that only letters are in this namespace, and they solely represent volumes. In other words, it is a process of naming the roots of the "forest" that represents the file-system (with each volume being an independent tree therein). Compare to Mount Points.

Mount Point – A mount point is a directory on a volume that an application can use to "mount" (set up for use) a different volume. Mount points overcome the limitation on drive letters and allow more logical organization of files and folders. Compare to "Mount as Drive Letter."

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Mounted Volume – The ability to see and use a backup image that is physically located somewhere else on the network. The backup image when mounted appears as a volume and behaves as if it is a part of the local computer system. Mounted volumes are read/write capable so users can update existing image files or scan for viruses or other malware and then repair the image file.
Operating System – An operating system (sometimes abbreviated as "OS") is the program that, after being initially loaded into the computer by a boot program, manages all the other programs in a computer. The other programs are called *applications* or application programs.

Partition – A partition is the portion of a physical disk or LUN that functions as though it were a physically separate disk. Once the partition is created, it must be formatted and assigned a drive letter before data can be stored on it. On basic disks, partitions can contain basic volumes, which include primary partitions and logical drives. On dynamic disks, partitions are known as dynamic volumes, which include simple, striped, spanned, mirrored, and RAID–5 (striped with parity) volumes.

Snapshot – An image backup type. A snapshot is a point-in-time view of a volume. When you perform a backup or scheduled backup, ShadowProtect will use either StorageCraft Volume Snapshot Manager (VSM) or Microsoft Volume Shadow Copy Service (VSS) to take a snapshot of the volume. Any changes that occur to the volume after the snapshot is taken are not included in the backup.

.spf – a file type extension representing a ShadowProtect full or base image file.

.spi – a file type extension representing a ShadowProtect incremental or differential image file.

.sp(number) – a file type extension representing a ShadowProtect image file that spans multiple files. The number following .sp is the sequence of the file in the spanned image file group.

Point-In-Time Backup – Point-in-time backup is the ability to get a backup of a file, folder or entire system at a specific point-in-time. These types of backups are often used to roll a computer back to a point prior to a computer problem.

Protected Volumes – Volumes that users have selected in the user interface to be protected by ShadowProtect.

Raid – *RAID* (Redundant Array of Independent Disks). A collection of disk drives that offers increased performance and fault tolerance. There are a number of different *RAID* levels. The three most commonly used are 0, 1, and 5:

- Level 0: striping without parity (spreading out blocks of each file across multiple disks).
- Level 1: disk mirroring or duplexing.
- Level 5: block-level striping with distributed parity.

Real-Time – Real time is a level of computer responsiveness that a user senses as sufficiently immediate or that enables the computer to keep up with some external process such as backing up.

Recovery Environment – See StorageCraft Recovery Environment.

Remote Computer (Node) – A computer that is physically located somewhere else on a network but is accessible from a local computer.

Service – A program, routine or process that performs a specific system function to support other programs, particularly at a low (close to the hardware) level.

Scheduled Job – This is a job that has been created in the ShadowProtect interface. Creating scheduled jobs alleviates the need for further user input, allowing the jobs to be completed automatically.

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Spanned Image Set – Is a backup image file that has been divided into multiple smaller files for easier management or storage. By dividing an image file into multiple smaller files, the backup image file can be saved to removable media such as CD or DVD.

StorageCraft Recovery Environment – A graphical, secondary boot environment (or operating system) that gives a user the minimal functionality needed to access backup image files on a network and restore them. This environment is typically used when a drive cannot be restored from within Windows or when the system has suffered a catastrophic failure and the entire hard drive must be restored.

System downtime – This refers to the amount of time a server or PC is offline and unable to serve up applications or allow users to use the resources on that system. This is commonly known as having the system out of production.

System Volume – This is the volume where the boot files are located to boot an operating system. Usually, this is the C:\ volume.

Tray Icon – A tray icon is a graphical representation of a computer program or application. For example, ShadowProtect uses a tray icon for the user to gain information about the program. Tray icons are loaded and reside in the system tray.

UNC (Universal Naming Convention) – A method used to identify folders, files and programs on a network computer. A UNC path begins with two backslashes \\ and is followed by the server name, the share name and usually the directory and/or the filename. For example, \\server_name\share_name\backup_name.spi.

Unprotected Volumes – Volumes not protected by ShadowProtect.

User Interface (UI) – Everything designed into an information device with which a human being may interact, including display screen, keyboard, mouse, light pen, the appearance of a desktop, illuminated characters, help messages and how an application program or a website invites interaction and responds to it.

Virtual Private Network (VPN) – A private data network that makes use of the public telecommunication infrastructure, maintaining privacy through the use of a tunneling protocol and security procedures. The idea of the VPN is to give the company the same capabilities at much lower cost by using the shared public infrastructure rather than a private one.

Virtual Volume – A volume that can be referenced but that does not physically exist on the system. ShadowProtect uses virtual volumes for the benefit of protecting computer systems.

Volume – An area of storage on a hard disk. A volume is formatted by using a file system, such as file allocation table (FAT) or NTFS, and typically has a drive letter assigned to it. A single hard disk can have multiple volumes, and volumes can also span multiple disks.

VSS Aware – Means an application has been designed to work with Microsoft Volume Shadow Copy Services (VSS) framework to ensure consistent data backup.

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